

**STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
PUBLIC UTILITIES COMMISSION**

**In Re: The Narragansett Electric Company
d/b/a National Grid
Annual Energy Efficiency Plan for 2018**

Docket No. 4755

ANNUAL ENERGY EFFICIENCY PLAN FOR 2018

SETTLEMENT OF THE PARTIES

November 1, 2017

November 1, 2017

BY HAND DELIVERY AND ELECTRONIC MAIL

Luly E. Massaro, Commission Clerk
Rhode Island Public Utilities Commission
89 Jefferson Boulevard
Warwick, RI 02888

**RE: Docket 4755 – The Narragansett Electric Company d/b/a National Grid
2018 Energy Efficiency Program Plan**

Dear Ms. Massaro:

I have enclosed ten copies of National Grid's¹ proposed Energy Efficiency Program Plan for 2018 (the 2018 Plan or Plan).² The Plan is a Stipulation and Settlement between National Grid, the Rhode Island Division of Public Utilities and Carriers (Division), the Rhode Island Office of Energy Resources (OER), the Energy Efficiency Resources Management Council (EERMC), Acadia Center, and People's Power & Light (PP&L) (collectively, the Parties).

The Company submits the Plan pursuant to the System Reliability and Least Cost Procurement statute, R.I. Gen. Laws § 39-1-27.7 and the Rhode Island Public Utilities Commission's (PUC) Standards for Energy Efficiency and Conservation Procurement, which the PUC approved in Docket 4684 (the Standards). The basis for least cost procurement in Rhode Island is the Comprehensive Energy Conservation, Efficiency, and Affordability Act of 2006 (R.I. Gen. Laws § 39-2-1.2), which encourages the investment in cost-effective energy efficiency. Section 1.1 of the Standards requires the Company to file annually a program plan with implementation details by program for the following program year. The 2018 Plan is consistent with the framework and savings goals established in the Three-Year Energy Efficiency Procurement Plan (Three-Year Plan), which the PUC approved in Docket 4684.

Below is a summary of the implementation details for the 2018 program year as set forth in the Plan.

The 2018 Plan proposes total budgets of \$94.6 million and \$28.1 million for electric and gas, respectively. The Company estimates that these expenditures could create substantial annual and lifetime savings for Rhode Island customers. Notably, the 2018 Plan will save 1,735,472 MWh over the lifetime of installed energy efficiency measures and 4,756,052 MMBtu over the lifetime of the natural gas measures. Investments made in energy efficiency to achieve

¹ The Narragansett Electric Company d/b/a National Grid (National Grid or Company).

² The Company is filing the 2017 Technical Reference Manual referenced in the Plan under separate cover.

these savings will add \$75.4 million to Rhode Island's state gross domestic product (GDP) and create more than 1,107 job-years of employment. Rhode Island customers realize \$2.84 in benefits for every \$1.00 invested in the Plan's electric programs, and \$2.76 in benefits for every \$1.00 invested in the Plan's natural gas programs.

The 2018 Plan builds upon the implementation strategies set forth in the Three-Year Plan and offers a suite of measures, programs, and initiatives to provide customers with the tools needed to save energy at one-third the cost of purchasing electricity and gas supply. In addition to lowering costs to customers that participate in programs, energy savings from the 2018 Plan will help to displace fossil fuel based electricity generation and avoid investments in the installation, upgrade, or replacement of transmission and distribution infrastructure. This provides cost savings to all customers, even those who do not directly participate in energy efficiency programs. In fact, the 2018 Bill Impact analysis included in Attachment 7 of this Plan finds that over the lifetime of the 2018 programs, the average Rhode Island customer's bill will be less than if there were no programs.

Although this Plan creates significant benefits to Rhode Island, its potential was limited by the budget cap requirement set forth in House Bill 5175 Sub A. Without the budget cap in place, the 2018 Plan could have saved 3,612 more annual MWh, 54,191 more lifetime MWh, and 72,902 more lifetime MMBtu of oil. In total, the reduction in savings results in Rhode Island electric customers losing \$14.9 million in lifetime benefits. In addition to the budget cap, RI H5175, "Relating To Making Appropriations For The Support Of The State For The Fiscal Year Ending June 30, 2018" requires that \$12.5 million from the 2018 Plan be transferred to the State Controller. The impact of this transfer is an increase in the Energy Efficiency Program Charge of \$0.00174 per kWh for all electric customers.

In accordance with the requirements of Least Cost Procurement statute, R.I. Gen. Laws § 39-1-27.7, to achieve the energy efficiency goals, the Plan proposes a fully reconciling funding mechanism that would decrease the current \$0.01124 per kWh Energy Efficiency Program (EEP) charge by \$0.00124 per kWh, resulting in a total EEP charge of \$0.01000 per kWh, for effect January 1, 2018. The Plan proposes a fully reconciling funding mechanism that would increase the current residential \$0.888 per dekatherm charge by \$0.010 per dekatherm, resulting in a total \$0.898 per dekatherm EEP charge for residential gas programs. The plan also proposes a fully reconciling funding mechanism that would increase the current commercial and industrial \$0.726 charge by \$0.001 per dekatherm, resulting in a total \$0.727 per dekatherm EEP charge for commercial and industrial gas programs.³

Subsection (c)(5) of the Least Cost Procurement statute provides the EERMC with the specific responsibility of reviewing and approving the cost-effectiveness of the Plan. Therefore, in accordance with the Least Cost Procurement statute, the EERMC has reviewed and approved the 2018 Plan, which complies with all aspects of the Least Cost Procurement statute.

³ These calculations are based on a January 1, 2018 effective date.

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Accordingly, the Company respectfully requests that the PUC approve the 2018 Plan so the Company can deliver the expected economic benefits from the 2018 Plan and meet the 2018 goals set forth in the Plan.

Thank you for your attention to this filing. If you have any questions, please contact me at 781-907-2121.

Sincerely,

A handwritten signature in blue ink, appearing to read "Raquel Webster", is positioned above the printed name.

Raquel J. Webster

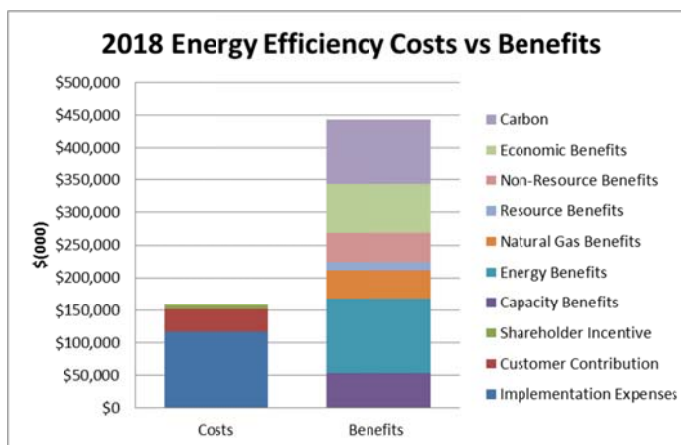
cc: Jon Hagopian, Esq.
Steve Scialabba, Division

EXECUTIVE SUMMARY

Executive Summary

National Grid's 2018 Annual Energy Efficiency Plan (Plan) includes a suite of services to provide all customers with the tools needed to take control of their energy usage and lower their bills. Customers can invest in energy efficiency measures such as weatherization, heating, lighting, and controls to save energy at one-third the cost of purchasing electricity and gas supply. In addition to lowering costs to customers that participate in programs, energy savings from the 2018 Plan will help to displace fossil fuel based electricity generation and avoid investments in the installation, upgrade, or replacement of transmission and distribution infrastructure, which in turn provides cost savings to all customers, even those that do not directly participate in energy efficiency programs. In fact, the 2018 Bill Impact analysis included in Attachment 7 of this Plan finds that over the lifetime of the 2018 programs, the average Rhode Island customer's bill will be less than if there were no programs.

The 2018 Plan will create significant benefits to Rhode Island. The 2018 Plan will save 1,735,472 MWh over the lifetime of installed energy efficiency measures and 4,756,052 MMBtu over the lifetime of the natural gas measures. Investments made in energy efficiency to achieve these savings will add \$75.4 million to Rhode Island's state gross domestic product (GDP) and create more than 1,107 job-years of employment.



The projected lifetime energy savings from this Plan will also avoid 1.2 million tons of carbon, the equivalent of removing 241,352 passenger vehicles from the road for one year. In total the 2018 Plan is expected to create over \$443.9 million in benefits over the life of the installed electric and natural gas energy efficiency measures. Energy savings and benefits are measured and verified by third party evaluation firms.

The 2018 Plan represents the first year of the 2018-2020 Three-Year Plan. The Three-Year Plan contained four themes that the 2018 Plan is built around:

1. Customers - Deliver comprehensive services that encompass all market segments and customers. Such services will enable customers to control their energy use, reduce their bills, and help support their financial well-being.

2. Least Cost - Deliver energy efficiency services as cost-effectively as possible through optimizing finance and promoting upstream initiatives.
3. Environment - Provide solutions that minimize greenhouse gas emissions and contribute to Rhode Island's clean energy policy goals, including the Resilient Rhode Island Act.
4. Future - Innovate to capture savings from new technologies and strategies to position energy efficiency programs for the future including the integration of energy efficiency with demand response, renewable energy, and smart grid technologies.

In line with these themes, the 2018 Plan includes several enhancements over previous years, while also continuing proven, nation-leading customer services. In the residential sector, new offerings include but aren't limited to automated benchmarking for multifamily facilities, increased incentives for delivered fuel weatherization, funding for the Capital Good Fund, National Retail Products Platform, and upstream incentives for heat pump water heaters. In the commercial and industrial (C&I) sector, the Plan includes new strategies to address the unique needs of customers depending on their annual usage, peak demand, and market. The C&I sector will also examine new approaches to finance, retro-commissioning and demand response. The 2018 Plan also contains a new cost-effectiveness test, the Rhode Island Test that allows for a more holistic view of the benefits and costs of energy efficiency and allows for new products and services such as strategic electrification of heating.

While this Plan creates significant benefits to Rhode Island, its potential was limited by the budget cap requirement set forth in House Bill 5175 Sub A. Without the budget cap in place, the 2018 Plan could have saved 3,612 more annual MWh, 54,191 more lifetime MWh, and 72,902 more lifetime MMBtu of oil. This means that electric customers in Rhode Island must purchase 3,612 MWh more of electricity in 2018 at an average rate that is more than a third higher than the cost of saving that energy through efficiency. In total, the reduction in savings results in Rhode Island electric customers losing \$14.9 million in lifetime benefits. Rhode Island will also lose out on a state GDP increase of \$6.5 million and a loss of 95 job years. In addition to the budget cap, RI H5175, "Relating To Making Appropriations For The Support Of The State For The Fiscal Year Ending June 30, 2018" requires that \$12.5 million from the 2018 Plan be transferred to the State Controller. The impact of this transfer is an increase in the Energy Efficiency (EE) Program Charge of \$0.00174 per kWh for all electric customers.

Despite these setbacks to energy efficiency, this Plan has sought to balance pursuing energy and financial savings from current technologies and programs while also seeking to identify new technologies, finance channels, and programs to continue delivering savings to Rhode Island customers for years to come.

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ATTACHMENTS

1. 2018 Residential Energy Efficiency Solutions and Programs
2. 2018 Commercial and Industrial (C&I) Energy Efficiency Solutions and Programs
3. 2018 Measurement and Verification Plan
4. Rhode Island Benefit Cost Test Description
5. 2018 Electric Energy Efficiency Program Tables
6. 2018 Gas Energy Efficiency Program Tables
7. 2018 Energy Efficiency Program Plan Bill Impacts

1. Introduction and Summary

The Narragansett Electric Company d/b/a National Grid (National Grid or Company) is pleased to submit this Annual Energy Efficiency Plan (Annual Plan or Plan) for 2018 to the Rhode Island Public Utilities Commission (PUC). This Plan has been developed by National Grid in collaboration with the Energy Efficiency Collaborative (Collaborative) and has been endorsed by the Energy Efficiency and Resource Management Council (EERMC).¹

This Plan is submitted in accordance with the Least Cost Procurement law, R.I. Gen. Laws § 39-1-27.7, the basis for which is the Comprehensive Energy Conservation, Efficiency, and Affordability Act of 2006, R.I. Gen. Laws § 39-2-1.2, and the Least Cost Procurement Standards (Standards), as revised by the EERMC and approved by the PUC at an Open Meeting on April 27, 2017 in Docket 4684. This Plan is being jointly submitted as a Stipulation and Settlement, entered into by the Rhode Island Division of Public Utilities and Carriers (Division), the Office of Energy Resources (OER), the EERMC, Acadia Center, People's Power & Light (PP&L), and National Grid (collectively, the Parties), and addresses issues raised by members of the Collaborative concerning the Company's electric and natural gas energy efficiency (EE) programs for calendar year 2018.

The 2018 Plan satisfies the statutory requirements for Least Cost Procurement and is consistent with the Three-Year Energy Efficiency Procurement Plan (Three-Year Plan) for 2018-2020.² The 2018 Annual Plan is cost-effective and has a cost that is lower than the cost of acquisition of additional supply for both electricity and natural gas, satisfying the requirements prescribed in R.I. Gen. Laws § 39-1-27.7 (a)(2).

The primary goal of the 2018 Annual Plan is to create energy and economic cost savings for Rhode Island consumers through energy efficiency, as required by R.I. Gen. Laws § 39-1-27.7. To that end, the 2018 Plan will create annual savings of 186,855 MWh and 414,795 MMBtu and lifetime savings of 1,735,472 MWh and 4,756,052 MMBtu. The Plan will generate benefits of more than \$443.9 million over the life of the measures

¹ Since 1991, a collaborative group (Collaborative) has been meeting regularly to analyze and inform the Company's electric and gas energy efficiency programs. Presently, members of the Collaborative presently include the Company, the Division and the Division's consultant, Synapse Energy Economics (Synapse), PP&L, TEC-RI, RI Housing, and Acadia Center. In addition, the OER and several EERMC members and representatives from the EERMC's Consulting Team participate in the Collaborative group. Since 1991, membership in the Collaborative has varied because some organizations have withdrawn and others have joined. Although TEC-RI participated in the negotiations regarding the 2018 Plan, it is not a party to the Stipulation and Settlement.

² The Company submitted the Three-Year Plan to the PUC on August 30, 2017 in Docket 4684.

(with \$342.4 million in benefits coming from electric efficiency and \$101.5 million in benefits from natural gas efficiency), which represents a large and urgently needed benefit for Rhode Island's residential, commercial, industrial, and income eligible energy customers.

These savings will provide a meaningful contribution to the Resilient Rhode Island Act (the Act). Under the Act, the State of Rhode Island set forth the goal to reduce greenhouse gas (GHG) emissions to 80% below 1990 levels by 2050.³ The Rhode Island Greenhouse Gas Emissions Reduction Plan (GHG Plan) identifies energy efficiency as an important component for achieving the GHG targets set forth in the Act.⁴ The electric, gas, and oil energy efficiency measures proposed in this Plan will avoid over 1.2 million tons of carbon over the lifetime of the installed measures.⁵ This represents 10% of the state's total carbon emissions and is the equivalent of removing 241,352 passenger vehicles from the road for one year.⁶

In addition to providing customers with cost-savings and contributing to the state's carbon reduction goals, the 2018 Annual Plan will also create significant economic benefits in Rhode Island. The Company expects that investments made in energy efficiency under this Plan will add \$75.4 million to Rhode Island's state gross domestic product (GDP) and create more than 1,107 job-years of employment.⁷ The vast majority of jobs created as a result of energy efficiency investments are local because they are tied to the installation of equipment and other materials. An analysis of National Grid's 2016 energy efficiency programs found that 82% of companies involved in the Company's energy efficiency programs were located in Rhode Island.⁸ These findings confirm that job creation is an additional significant benefit that National Grid's investments in energy efficiency contribute to Rhode Island's economy overall and

³ R.I. Gen. Laws § 42-6.2.

⁴ Rhode Island Greenhouse Gas Emissions Reduction Plan, December 2016.

⁵ Takes into account the net impact of EE measures on carbon emissions. The marginal carbon emission rates are from "Avoided Energy Supply Costs in New England: 2015 Report" Figure 4-15 on page 4-39. The report is available online at: <http://ma-eeac.org/wordpress/wp-content/uploads/2015-Regional-Avoided-Cost-Study-Report1.pdf>.

⁶ RI carbon emissions equal 11.33 million metric tons (<https://www.eia.gov/environment/emissions/state/>). Carbon equivalency value calculated from <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

⁷ Macroeconomic multipliers for the economic growth and job creation benefits of investing in cost-effective energy efficiency from National Grid's 2014 Regional Economic Model (REM) Analysis as presented by the Company to the Collaborative on May 29, 2014. To maintain consistency with RI Test economic benefits multiplier, the Company is only including construction phase impacts to GDP and job-years to account for only direct and indirect impacts.

⁸ Peregrine Energy, "Analysis of Job Creation from 2016 Expenditures for Energy Efficiency in Rhode Island by National Grid", April 24, 2016 (filed as part of National Grid's 2016 Year-End Report).

directly to the business owners and their employees who deliver these programs and services.

Table 1: 2018 Energy Efficiency Program Plan Summary

Electric Programs by Sector	Implementation Spending (\$000)	Customer Contribution (\$000)	Annual MWh Savings	Annual kW Savings	Lifetime MWh Savings	Total Benefits (\$000)	RI Test B/C Ratio	¢/lifetime kWh	Participants
Non-Income Eligible Residential	\$33,815.0	\$7,654.8	79,868	9,264	361,283	\$94,637.2	2.19	11.5	533,877
Income Eligible Residential	\$11,868.3	\$0.0	7,472	865	59,935	\$38,876.5	3.12	19.8	7,550
Commercial and Industrial	\$43,037.2	\$18,339.3	99,515	14,673	1,314,255	\$208,925.2	3.29	4.7	2,897
Regulatory	\$1,412.1								
Subtotal	\$90,132.6	\$25,994.1	186,855	24,802	1,735,472	\$342,439.0	2.84	6.7	544,324
Gas Programs by Sector	Implementation Spending (\$000)	Customer Contribution (\$000)	Annual MMBtu Savings		Lifetime MMBtu Savings	Total Benefits (\$000)	RI Test B/C Ratio	\$/lifetime MMBtu	Participants
Non-Income Eligible Residential	\$12,490.2	\$5,548.6	146,706		1,467,079	\$38,849.6	2.08	12.30	110,837
Income Eligible Residential	\$6,374.6	\$0.0	28,842		539,054	\$20,851.4	3.27	11.83	4,175
Commercial and Industrial	\$7,316.7	\$3,111.0	239,246		2,749,920	\$41,773.8	3.87	3.79	1,992
Regulatory	\$590.3								
Subtotal	\$26,771.8	\$8,659.6	414,795		4,756,052	\$101,474.8	2.76	7.45	117,004
Total for Plan	\$116,904.4	\$34,653.7				\$443,913.8	2.82		661,328

(1) Implementation spending does not include customer contributions, shareholder incentive, or commitments.

(2) Regulatory Includes contributions to OER and EERMC

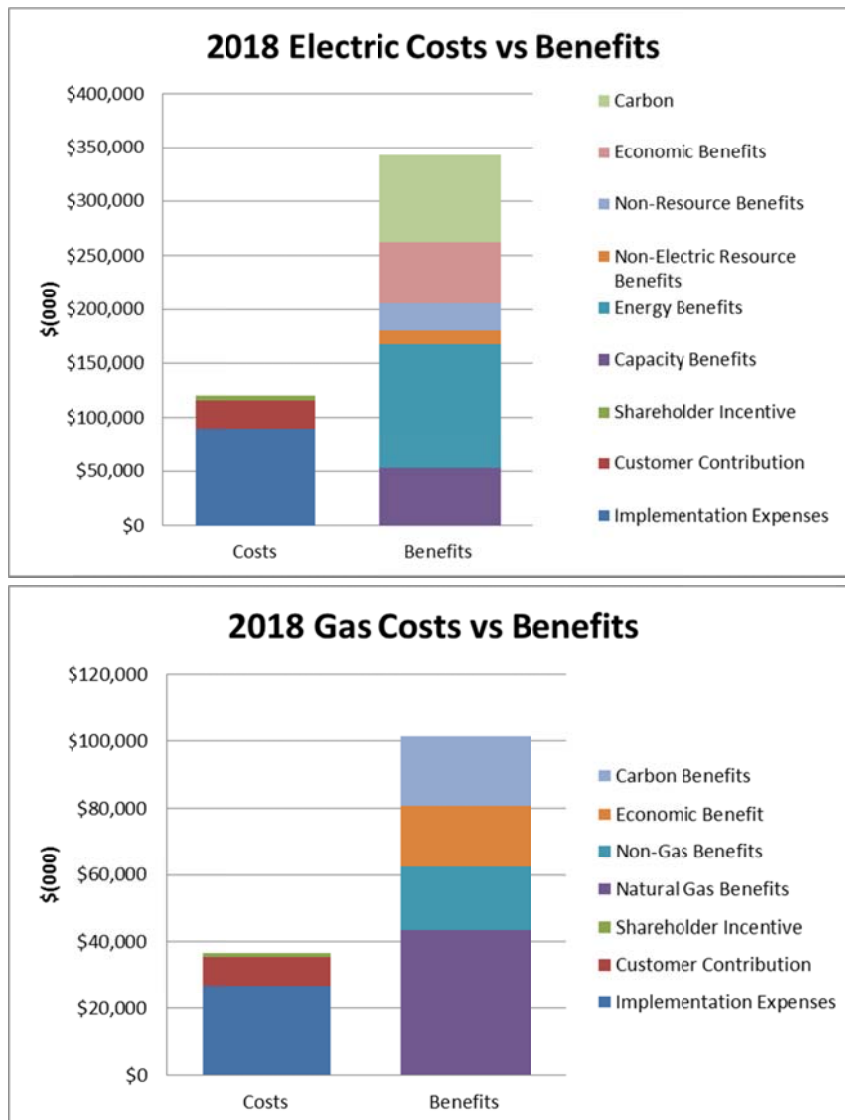
As noted above, these savings meet the requirements for cost-effectiveness. The revised Standards set forth new requirements for a cost-effectiveness test called the Rhode Island Benefit Cost Test (RI Test), which “more fully reflects the policy objectives of the State with regard to energy, its costs, benefits, and environmental and societal impacts.”⁹ In accordance with the Standards, the Company worked in collaboration with the Division consultants, EERMC consultants, OER, and the Collaborative to incorporate new benefits into the RI Test that were approved as part of the 2018-2020 Three-Year Plan in Docket 4684. The RI Test includes greenhouse gas reduction values and economic benefits as described in Attachment 4.

⁹ Least Cost Procurement Standards (Standards) approved at the Open Meeting on April 27, 2017 in Docket 4684.

As defined by the Standards in Docket 4684, the Plan's RI Test benefit-cost ratio - the ratio of Total Benefits/Total Costs - must be greater than 1.0.¹⁰ The overall electric EE Program RI Test ratio is 2.84, and the overall natural gas EE Program RI Test ratio is 2.76. This means that for each \$1 invested, electric programs will create \$2.84 of benefits over the lifetime of the investment, and natural gas efficiency investments will create \$2.76 in benefits over the lifetime of the investments.

The Standards further require the Company to show a comparison between the RI Test and the Total Resource Cost (TRC) Test. The overall electric EE Program TRC Test ratio is 1.71, and the overall natural gas EE Program TRC Test ratio is 1.70. The TRC Test comparison is included in Table E-5A and G-5A.

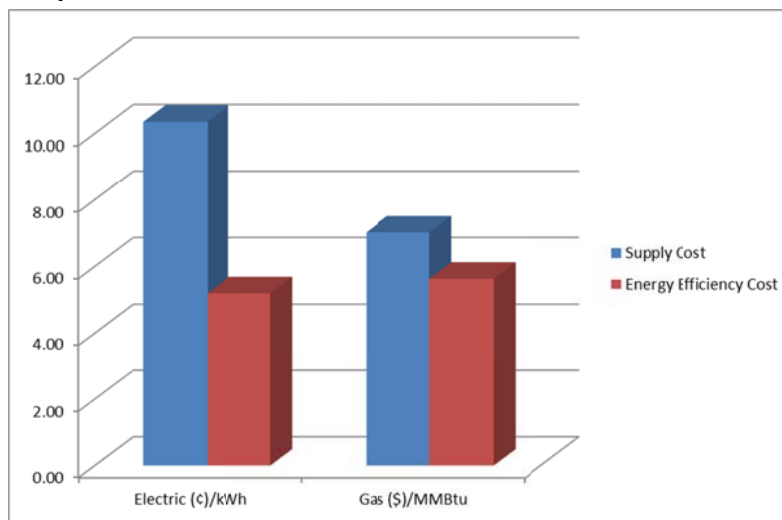
Graph 1. 2018 Annual Plan Total Benefits and Total Costs (RI Test)



¹⁰ Standards, Section 1.4(C).

In addition to satisfying the primary statutory requirement of cost-effectiveness, the Plan satisfies the additional requirement that the cost of energy efficiency procured be less expensive than the cost of supply. Least Cost Procurement requires the Company to procure “energy efficiency and energy conservation measures that are prudent and reliable and when such measures are lower cost than acquisition of additional supply.”¹¹ As prescribed by statute, the Company procures energy efficiency resources instead of supply to meet customer energy demand. If what the Company spends on acquiring energy savings is less than acquiring additional supply, the Plan meets this requirement. The Company’s cost to achieve the lifetime savings for the electric energy efficiency portfolio is 5.19¢ per lifetime kWh saved. This is 5.15¢ less than the weighted average cost of electric supply across all customer sectors.¹² The Company’s cost to achieve the lifetime savings for the natural gas energy efficiency portfolio is \$5.63 per lifetime MMBtu saved. This is \$1.39 less than the weighted average cost of gas supply across all customer sectors.¹³

Graph 2. 2018 Annual Plan Total Benefits and Total Costs



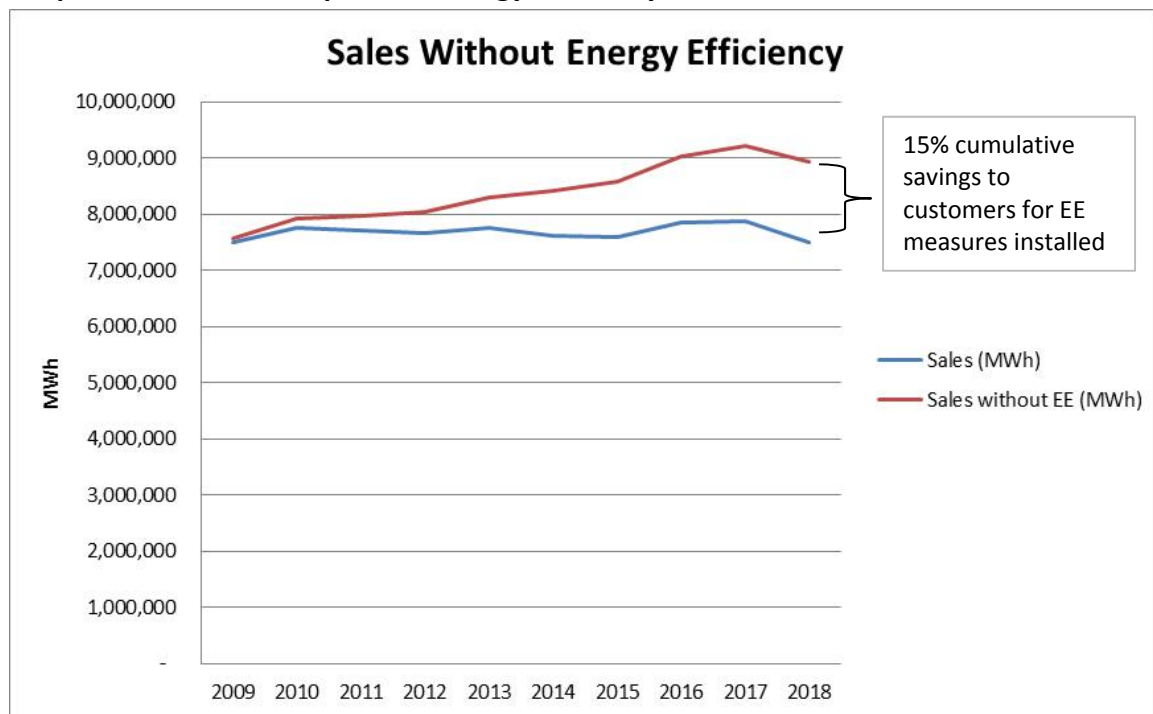
¹¹ R.I. Gen. Laws § 39-1-27.7 (a)(2).

¹² The methodology for comparing costs was updated in this Plan to reflect industry best practices. See: <http://utilityscalesolar.lbl.gov/sites/all/files/lbnl-6595e.pdf> as an example). The electric supply cost is based on the average Standard Offer Charge for all Residential, Commercial and Industrial customers weighted by the lifetime savings in each sector in the 2018 Plan and levelized over the average lifetime of all measures in the plan. The Standard Offer Charge for Residential and Commercial customers is effective from October 1, 2017 until March 31, 2018. See: http://www9.nationalgridus.com/narragansett/non_html/SOS_Rates_Table_Residential.pdf and http://www9.nationalgridus.com/narragansett/non_html/SOS_Rates_Table_Commercial.pdf. The Industrial customer charge is the average Standard Offer Charge in 2017 (see: https://www9.nationalgridus.com/narragansett/non_html/SOS_Rates_Table_Industrial.pdf).

¹³ The natural gas supply cost is based on the avoided cost of gas to Residential and Commercial and Industrial customers weighted by the lifetime savings in each sector in the 2018 Plan and levelized over the average lifetime of all measures in the plan. The values are from the Avoided Energy Supply Costs in New England: 2015 Report Update for year 2017.

Over time, the benefits of procuring energy efficiency at a cost less than supply accrue to customers. Graph 3 shows the cumulative energy savings for just those energy efficiency measures installed since 2009 (the first year of programs implemented under Least Cost Procurement). Because the average measure life of energy efficiency measures is 10 years, the Company expects that measures installed in 2009 are still providing the same level of energy savings through 2018. This is also true for those measures installed in and after 2009.¹⁴ The only exception is the savings from Home Energy Reports. This program only has a one-year measure life, and is counted as such in the graph below because it connects with customers annually to prompt them to keep taking energy saving actions. In Graph 3 below, the area between the blue and red lines represents the cumulative annual MWh savings for measures installed since 2009. All these MWh savings were obtained at a cost lower than the cost of supply. From 2009 to projected year-end 2017, electric energy efficiency programs will have saved an estimated 5.7 million MWh. Without these energy savings, Rhode Island customers would have had to purchase 15% more energy at a higher cost.

Graph 3: Cumulative Impacts of Energy Efficiency



This cost-effective 2018 Annual Plan includes an investment of \$94.6 million for electric energy efficiency implementation in 2018. If approved, this will be funded by the

¹⁴ Actual lifetime varies by measure but is not included in Graph 3 for ease of illustration. When the Company reports out on savings to ISO-NE it takes into account impact of each measure's life.

existing energy efficiency program charge of \$0.01124 per kWh, and additional funding sources including ISO-NE Forward Capacity Market (FCM) proceeds. Pursuant to R.I. Gen. Laws § 39-1-27.7(c)(5), a fully reconciling mechanism of negative \$0.00124 per kWh is needed to fully fund the cost-effective electric energy efficiency programs for 2018.

This Plan also includes a \$28.1 million investment in cost-effective natural gas energy efficiency implementation. If approved, this investment will be funded by the existing energy efficiency program charge of \$0.888 per dekatherm for residential customers and \$0.726 per dekatherm for non-residential customers. Pursuant to R.I. Gen. Laws § 39-1-27.7(c)(5), a fully reconciling mechanism of \$0.010 per dekatherm for residential customers and \$0.001 per dekatherm for non-residential customers will be needed to fully fund the cost-effective natural gas energy efficiency programs for 2018.

All Rhode Island electric and gas customers will benefit from lower costs due to investments in energy efficiency whether they participate or not. The Company determines these savings through the Bill Impact analysis that is detailed in Attachment 7. The savings that customers will realize from participating in the energy efficiency programs will offset the energy efficiency program charge. The Bill Impact analyses of the gas and electric programs show that the average participant will save more than they invest in the energy efficiency program charge. As detailed in Attachment 7, the average participant will see the following reductions in their combined electric and gas bills over the life of the installed measures when compared to not having the 2018 energy efficiency program charge: Residential (1.24%, \$30.34); Low Income (6.19%, \$133.51); Small C&I (12.60%, \$962.77); Medium C&I; (10.84%, \$2,410.18); Large C&I (3.99%, \$19,043.56). Non-participants benefit from power market effects and avoided investment in infrastructure due to energy efficiency that is also reflected in rates. When the impacts on both participants and non-participants are averaged, the analysis shows that the average Rhode Island customer sees bill savings from energy efficiency. One of National Grid's objectives is to reach as many customers as possible to increase the participant and overall bill savings in Rhode Island.

2. Annual Plan Compared to Three-Year Plan for Year 2018

The ambitious energy and cost savings for the 2018 program year are consistent with the objectives and requirements of Least Cost Procurement and exceed the savings targets proposed in the Three-Year Plan in Docket 4684. The electric savings goal proposed for 2018 is 186,855 MWh, or 2.50% of the referenced 2015 load. The natural gas savings goal for 2018 is 414,795 MMBtu, or 1.01% of 2015 natural gas load. Proposing higher electric and gas goals in the Annual Plan, compared to the Three-Year

Plan, demonstrates National Grid's continued commitment to a data-driven process whereby goals will be set at the most aggressive and nation-leading levels that are achievable in practice, a principle described in the Three-Year Plan.

The following table compares the 2018 Annual Plan components to the 2018-2020 Three-Year Plan.

Table 2: Annual Plan compared to Three-Year Plan for Year 2018

Electric Programs	2018 3 Year Plan	2018 Annual Plan	% Change
Annual MWh Savings	179,968	186,855	4%
Lifetime MWh Savings	1,712,064	1,735,472	1%
Annual Peak kW Savings	29,639	24,802	-19%
Total Benefits	\$ 373,004,694	\$ 342,439,012	-9%
Total Spending	\$ 103,047,860	\$ 94,568,584	-9%
Benefit Cost Ratio (RI Test)	2.93	2.84	-3%
Cost/Lifetime kWh	\$ 0.071	\$ 0.067	-7%
EE Program Charge per kWh	\$ 0.01090	\$ 0.01000	-9%
Gas Programs	2018 3 Year Plan	2018 Annual Plan	% Change
Annual MMBtu Savings	396,113	414,795	5%
Lifetime MMBtu Savings	4,552,056	4,756,052	4%
Cost/Lifetime MMBtu	\$ 8.17	\$ 7.45	-10%
Total Benefits	\$ 97,702,163	\$ 101,474,752	4%
Total Spending	\$ 29,399,869	\$ 28,080,908	-5%
Benefit Cost Ratio (RI Test)	2.53	2.76	8%
C&I EE Program Charge per Dth	\$ 0.721	\$ 0.727	1%
Residential EE Program Charge per Dth	\$ 0.882	\$ 0.898	2%

Each year, the Company creates an Annual Plan that attempts to meet the savings targets set out in the Three-Year Plan while meeting the requirements of the law that the Plan must be cost-effective and less than the cost of supply. However, as noted in previous PUC dockets, Annual Plans may contain budgets and EE Program Charges that vary from those contained in the Three-Year Plan.¹⁵ The Three-Year Plan creates savings targets and illustrative budgets to guide the Company in the development and long-

¹⁵ PUC Order No. 21781 approving National Grid's September 2, 2014 Energy Efficiency and System Reliability Procurement Plan for three-year period 2015-2017. Written Order issued 12/19/14.

term strategy of its Annual Plans over the upcoming three-year period. After the Company files the Three-Year Plan, there are numerous factors that may lead to changes in funding needs and savings availability. These include: updates to the avoided cost study, electric and gas sales, available fund balance, Regional Greenhouse Gas Inc. (RGGI) auction revenue, ISO-New England's (ISO-NE) Forward Capacity Market (FCM) auction proceeds, evaluation results, market conditions, customer preferences, and changes in legislation.

For the 2018 Annual Plan, the electric and natural gas energy efficiency portfolio savings, benefits, budgets, and EE Program Charges differ compared to the illustration presented in the Three-Year Plan. There are several factors contributing to this difference.

A. Impact of State Appropriations on 2018 EE Plan Electric Portfolio

The state's 2018 fiscal year budget established in 2017 House Bill 5175 Sub A set forth the requirement that "The 2018 program year plans total budget shall not exceed the commission-approved total budget for the 2017 system reliability and energy efficiency and conservation procurement program plan."¹⁶ This requirement (budget cap) lowered the total electric spending, cost per savings, and EE Program Charge compared to the Three-Year Plan.

This budget cap also reduced the amount of cost-effective electric savings that could have been achieved in 2018. Without the budget cap in place, the 2018 EE Plan could have saved 3,612 more annual MWh, 54,191 more lifetime MWh, and 72,902 more lifetime MMBtu of oil. This means that electric customers in Rhode Island must purchase 3,612 MWh more of electricity in 2018 at an average rate that is more than a third higher than the cost of saving that energy through efficiency. In total, the reduction in savings results in Rhode Island electric customers losing \$14.9 million in lifetime benefits. The impact of the budget cap also harms the Rhode Island environment and economy. The state loses the ability to avoid 35,966 tons of carbon emissions. The reduction of cost-effective spending on energy efficiency implementation in the RI economy also impacts the economy. Rhode Island will lose out on a state GDP increase of \$6.5 million and a loss of 95 job years.

¹⁶ Full Bill available at: <https://legiscan.com/RI/text/H5175/id/1636288>

B. Evaluation Results

Annual and lifetime electric and gas savings are higher in the Annual Plan than in the Three-Year Plan. This is due to the completion of several evaluations after the Three-Year Plan was filed that increased the claimable savings. The evaluations include C&I Custom Realization Rate studies, C&I Free Ridership and Spillover Study, and the C&I Upstream Lighting Study. Together, these studies increased the amount of Annual MWh savings the Company can claim from 179,968 to 186,855 and the Annual MMBtu savings from 396,113 to 414,795.

Lifetime benefits from gas savings increased as compared to the Three-Year Plan. This is due to the increased energy savings described above. Gas benefits increased from \$97.7 million to \$101.5 million.

C. Updated Sales and Fund Balance Projections

The EE Program Charge for electric and gas customers varies from the Three-Year Plan to the Annual Plan for several reasons, including updates to the sales projections, fund balance projections, and program budgets, which are all factors in the calculation of the charge.

The gas EE Program Charge increased from \$0.882 to \$0.898 per Dth for residential customers and from \$0.727 for C&I customers. While the gas sales projection remains the same as in the Three-Year Plan and the gas budget decreased by \$1.4 million, the updated gas fund balance projection is lower by \$1.3 million which places upwards pressure on the charge.

While the sales forecast and fund balance projection both decreased in the electric sector, the electric EE Program Charge decreases from \$0.01090 to \$0.01000 due to the application of the budget cap.

3. Strategies to Achieve Goals

The primary goal of the 2018 Annual Plan is to create cost-effective energy savings for Rhode Island electric and gas customers through energy efficiency. This Plan has sought to balance pursuing energy and financial savings from current technologies and programs while also seeking to identify new technologies, finance channels, and programs to continue delivering savings to Rhode Island customers for years to come. The Plan achieves the goals laid out above by implementing the following key priorities, introduced in Docket 4684:

1. **Customers** - Deliver comprehensive services that encompass all market segments and customers. Such services will enable customers to control their energy use, reduce their bills, and help support their financial well-being.
2. **Least Cost** - Deliver energy efficiency services as cost-effectively as possible through optimizing finance and promoting upstream initiatives. Continuing to deliver cost-effective energy savings under Least-Cost Procurement will create cost savings to all customers, while creating economic benefits that create and maintain local jobs and businesses.
3. **Environment** - Provide solutions that minimize greenhouse gas emissions and contribute to Rhode Island's clean energy policy goals, including the Resilient Rhode Island Act.
4. **Future** - Innovate to capture savings from new technologies and strategies to position energy efficiency programs for the future including the integration of energy efficiency with demand response, renewable energy, and smart grid technologies. This includes incorporating outcomes from the Rhode Island Power Sector Transformation Initiative and Docket 4600.

The application of these priorities is more fully described in the detailed program and marketing descriptions in Attachments 1 and 2.

4. Delivering 2018 Goals

National Grid will build on its almost thirty years of experience to deliver the energy and cost savings goals in this Plan.¹⁷

a. Residential Programs

In 2018, the Parties agree to continue the residential programs offered in 2017. The Parties also agree to offer new programs and demonstrate the development of new technologies for potential inclusion in programs in future years. The programs are summarized below and described in further detail in Attachment 1. The description of each program includes proposed changes from 2017 that are intended to help meet the savings targets for 2018.

¹⁷ Throughout the program year, the Parties may consider additional enhancements beyond those identified in this Plan as more information becomes available to support an informed review of those potential changes. As part of this process of identifying additional enhancements, in addition to continuing to meet with the Collaborative, the Company will continue its work sessions with the EERMC's consultants.

Table 3. Residential Energy Efficiency Programs	
EnergyWise Program (Funded by Electric and Gas)	EnergyWise offers single-family customers home energy assessments and information regarding their actual energy usage. Participants in this program receive recommendations and technical assistance as well as financial incentives to replace inefficient lighting fixtures, appliances, thermostats, and insulation levels with models that are more energy efficient. The program addresses base load electric use and heating and cooling energy loads in all residential buildings. The program recommends efficient products that are delivered through National Grid's various programs as well as solar opportunities provided through statewide solar initiatives. The program will continue to deliver finance opportunities to customers such as the Heat Loan and the Rhode Island Infrastructure Bank's residential financing opportunities. In 2018, the Company plans to establish a \$500,000 revolving loan opportunity for the Capital Loan Fund to support more EnergyWise customers.
Multifamily Programs Income Eligible, Residential and Commercial sectors (Funded by Electric and Gas)	Comprehensive energy services for multifamily customers include energy assessments, incentives for heating and domestic hot water systems, cooling equipment, lighting, and appliances. Coordinated services will be offered for all types of multifamily properties. An approach tailored for multifamily properties designates a primary point-of-contact to manage and coordinate services offered through the Company's existing portfolio, including EnergyWise, C&I Retrofit, Residential New Construction, Income Eligible, and the ENERGY STAR® HVAC programs. In 2018, the Company will use a number of avenues to meet the needs of its customers including: heat pumps and smart technologies, a customer centric recruiting process, building benchmarking data, and a continued focus on finance opportunities
Income Eligible Single Family (Funded by Electric and Gas)	Income Eligible Services, also known as the Single Family Low Income Services, are delivered by local Community Action Program (CAP) agencies with oversight provided by a Lead Industry Partner. Three levels of home energy assessments will be offered: (1) lighting and appliance focus, (2) heating and weatherization focus, and (3) comprehensive focus. Customers who qualify for LIHEAP are eligible and receive all services and equipment upgrades at no cost. In 2018, the Company will collaborate with the Rhode Island Department of Human Services (RI DHS) to leverage job development and explore the possibility of new program offerings like smart home technologies, Wi-Fi thermostats, and mini splits.

Residential New Construction (Funded by Electric and Gas)	The program promotes the construction of high-performing energy efficient single family, multifamily, and low income homes, as well as the education of builders, tradesmen, designers, and code officials. In 2018, the Company will adopt a new User Defined Reference Home (UDRH) baseline that will reflect the current energy efficiency of new construction single-family homes in Rhode Island.
Residential Home Energy Report Program (Funded by Electric and Gas)	The Home Energy Reports (HER) program is the Company's key program to achieve energy savings through changes in customer behavior by presenting personalized energy usage data and encouraging desired behaviors to reduce energy consumption. The Company will continue to deliver Home Energy Reports that offer enhanced feedback tools to inspire customers to take actions that reduce their energy consumption and also increase their participation in other energy efficiency programs.
ENERGY STAR® Lighting (Funded by Electric Only)	This is an initiative implemented jointly with other regional utilities. It provides discounts to customers for the purchase of ENERGY STAR® lighting through instant rebates, special promotions at retail stores, pop-up retailer, and social marketing campaigns. In 2018, there will be additional emphasis on providing incentives to hard-to-reach communities where the traditional retail channels may not have as large of a presence as discount retailers. In addition, the Company will continue to use online flash sales in 2018.
Residential Consumer Products (Funded by Electric Only)	This program is run in collaboration with other regional utilities to promote the purchase of high efficiency household appliances, including kitchen appliances and electronics. These appliances carry an ENERGY STAR® label. The program also offers refrigerator recycling, which promotes more efficient refrigerators while removing non-efficient units from the market. In 2018, the program will support dehumidifiers, dryers, refrigerator and freezer recycling, room air cleaners, room air conditioners, advanced power strips, and efficient shower heads. The Company will also support federal appliance and equipment standards development and renew efforts to advance efforts at the state level.
ENERGY STAR® HVAC Program (Funded by Electric and Gas)	This program promotes the installation of high efficiency central air conditioners for electric customers and new energy efficient natural gas related equipment including boilers, furnaces, water heating equipment, thermostats, boiler reset controls, and furnaces equipped with high efficiency fans. The program provides training of contractors in installation, testing of the high efficiency systems, tiered rebates for new ENERGY STAR® systems, and incentives for checking new and existing systems. The program also includes oil and propane heating equipment rebates.

Community Based Initiatives (C&I and Residential, Funded by Electric and Gas)	The initiative is designed to leverage trusted community partnerships and develop targeted marketing strategies in order to promote all energy efficiency programs, residential and commercial, in specific targeted communities or businesses.
Residential Demonstration and Research and Development (Funded by Electric and Gas)	Under this program, the demonstrations test innovative technologies. In 2018, the Company innovative technologies that the Company plans to test include energy storage, emerging lighting controls, energy monitoring, zero energy homes, and other new technologies.
Education Programs (Funded by Electric Only)	The Company promotes energy education to private and public schools and youth groups through the National Energy Education Development (N.E.E.D) Program. This program provides curriculum materials and training to students and teachers in grades K-12.

b. Residential Income Eligible Programs

The Company and the Parties want customers who have a high energy burden and/or difficulty paying their electric bills to participate in, and benefit from, the Company's energy efficiency programs, especially in these difficult economic times. Therefore, this segment of the customer base is designated as a unique sector, and funding for this sector will be subsidized by both non-low-income residential customers and commercial and industrial customers using 13% of total implementation funding for the electric programs, and 24% for natural gas programs.

In addition to the Income Eligible Single Family and Multifamily programs, the Residential New Construction Program also works with housing authorities and developers to build energy-efficient multifamily properties. Additional details about the services offered to economically disadvantaged customers are described in the residential programs in Attachment 1.

c. Commercial and Industrial Programs

In 2018, the Parties agree to continue the commercial and industrial programs offered in 2017 and pilot the development of new technologies for potential inclusion in programs in future years. These programs are summarized in Table 4 below.

Table 4. Commercial and Industrial Energy Efficiency Programs	
Large Commercial New Construction Building Energy Code and Appliance Standards (Funded by Electric and Gas)	<p>This program promotes energy efficient design and construction practices in new and renovated commercial, industrial, and institutional buildings. The program promotes and incentivizes the installation of high efficiency equipment in existing facilities during building remodeling and at the time of equipment failure and replacement. Large Commercial New Construction aims to prevent or mitigate lost opportunities because a customer who does not install energy efficient equipment at the time of new construction or equipment replacement will likely never make the investment for that equipment or will make the investment at a much greater cost at a later time. The program provides both technical and design assistance to help customers identify efficiency opportunities in their new building designs and to help them refine their designs to pursue these opportunities. Incentives are also offered to owner's design teams for their time and effort to meet program requirements. Operations Verification or quality assurance is also offered to ensure that the equipment and systems operate as intended.</p> <p>The program also promotes building code compliance and provides technical assistance in promoting new and improved appliance standards regulations. Support the development and adoption of the Stretch Building Code to support the States goals and objectives.</p> <p>Finally the program supports the States Zero Energy Building (ZEB) goals through engagement and development of ZEB programs in the future.</p>
Large Commercial Retrofit (Funded by Electric and Gas)	<p>Large Commercial Retrofit is a comprehensive retrofit program designed to promote the installation of energy efficient equipment such as lighting, motors, and heating, ventilation and air conditioning (HVAC) systems, thermal envelope measures, and custom measures in existing buildings. All commercial, industrial, and institutional customers are eligible to participate. The Company offers technical assistance to customers to help them identify cost-effective efficiency opportunities, and pays incentives to assist in defraying part of the material and labor costs associated with the energy efficient measures.</p> <p>The Company also offers education and training, such as the building operator certification (BOC) training, to support the implementation and adoption of energy efficiency.</p>

Table 4. Commercial and Industrial Energy Efficiency Programs	
Small Business Direct Install (Funded by Electric and Gas)	The Small Business Direct Install Program provides direct installation of energy efficient lighting, non-lighting retrofit measures, and gas efficiency measures. Electric customers with average monthly demand of less than 200 kW are eligible to participate. There is no eligibility criterion for gas consumption. The program's lighting and non-refrigeration measures are delivered through one labor and one product vendor selected through a competitive bidding process. The Customer share of the total project cost of a retrofit is discounted 15% for a lump sum payment or the customer has the option of spreading the payments over a two-year period, interest free.
Commercial and Industrial Demonstrations and Research and Development (Funded by Electric and Gas)	The demonstrations test innovative technologies for saving both gas and electricity. In 2018, innovative technologies which are planned to be tested include: zero energy projects, Power over Ethernet (PoE) lighting system, performance based procurement, and indoor agriculture.

Attachment 2 includes descriptions of these programs. Included in the description of each program are proposed changes from 2017 that are intended to help meet the savings targets for 2018.

d. Participation

Each program described in this Plan seeks to drive customer participation to deliver the benefits of energy efficiency to customers throughout Rhode Island. The Plan is designed to provide equitable access to savings and programs across sectors and market segments. For 2018, the Company will continue to plan and report participation in 'net' terms, which takes into account free-ridership and spillover, which are commonly referred to as net-to-gross factors. This method of accounting for participants aligns participation numbers with energy savings numbers, which are already recorded in net terms. This approach provides a more accurate connection between energy savings and the number of customers who benefit from efficiency programs. Planned participation estimates are included in Attachment 5, Table E-7 and Attachment 6, Table G-7.

The following table describes the definitions for how National Grid projects, tracks, and reports participation in the efficiency programs.

Table 5: Participation Definitions

Fuel	Sector	Program	Participation Unit
Gas	Commercial & Industrial	Large Commercial New Construction	Unique Billing Account
		Large Commercial Retrofit	Unique Billing Account
		Small Business Direct Install	Unique Billing Account
		C&I Multifamily	Housing Units
	Income Eligible Residential	Single Family – Income Eligible Services	Unique Billing Account
		Income Eligible Multifamily	Housing Units
	Residential	Energy Star® HVAC	Unique Billing Account
		EnergyWise	Unique Billing Account
		EnergyWise Multifamily	Housing Units
		Home Energy Reports	Adjusted* Unique Billing Account
		Residential New Construction	Housing Units
Electric	Commercial & Industrial	Large Commercial New Construction	Unique Billing Account
		Large Commercial Retrofit	Unique Billing Account + Unique Customer names from Upstream Lighting
		Small Business Direct Install	Unique Billing Account
	Income Eligible Residential	Single Family – Income Eligible Services	Unique Billing Account
		Income Eligible Multifamily	Housing Units
	Residential	Energy Star® HVAC	Unique Billing Account
		EnergyWise	Unique Billing Account
		EnergyWise Multifamily	Housing Units
		Home Energy Reports	Adjusted* Unique Billing Account
		Residential New Construction	Housing Units

Fuel	Sector	Program	Participation Unit
		ENERGY STAR® Lighting	Estimated Housing Units
		ENERGY STAR® Products	Number of Rebates

* For Home Energy Reports, participants will be counted as the number of customers receiving reports (i.e., the “treatment group”) adjusted by the “Read Rate” of 75% from the most recent Customer Engagement Tracker Survey.

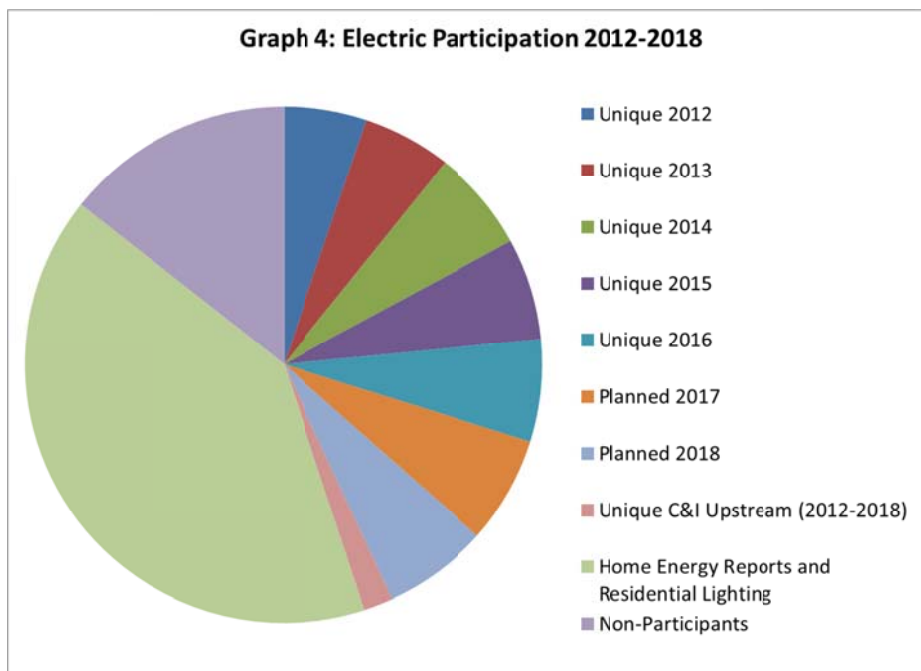
The Company also aims to estimate the number of unique participants for each program. For some programs such as ENERGY STAR® Lighting and ENERGY STAR® HVAC, one measure does not necessarily equal one participant. This is because a customer can purchase more than one measure. Therefore, the Company also considers the previous year’s unique accounts to savings ratio in order to estimate the planned unique participants in 2018. This method allows for a better estimation of unique participants but can make it more difficult to compare planned numbers across years.

In 2018, the Company will continue to drive participation through two main pathways – targeted programs and broad based programs. Targeted programs include the Company’s retrofit, new construction, product rebate, and direct install initiatives. These programs serve to drive deeper savings to targeted customer segments and offer a wide array of energy efficiency measures. The Company also reaches broad participation by promoting products upstream, and Home Energy Reports. These broader based programs provide value by reaching a wide and diverse set of customers, helping to provide more customers with access to energy savings, as well as acting as a gateway to drive participation in other National Grid energy efficiency programs.

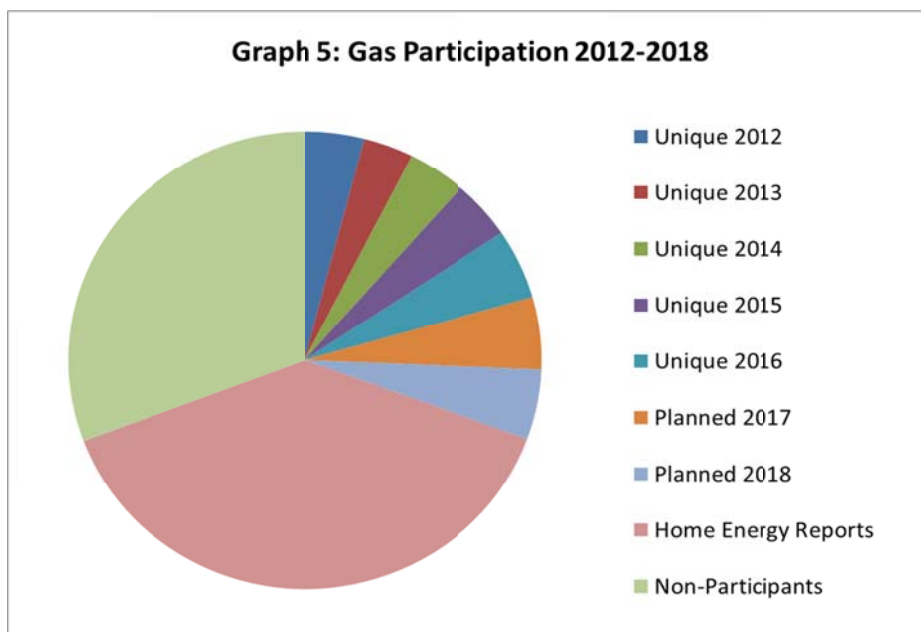
A recent analysis of unique participation since 2012 is detailed in Graphs 4 and 5 below. These graphs highlight that the Company has made steady progress with reaching new participants each year. From 2012-2016 the Company served approximately 30% of its electric customers and 21% of its gas customers from its targeted programs at least once (these graphs have removed duplicate participation across programs and across years from 2012-2016). When Home Energy Reports and C&I upstream lighting participation are added to these counts, a total of 82% of electric customers and 69% of gas customers participated over this period.¹⁸ Home Energy Reports are included here because the program offers significant savings and benefits to customers as well as

¹⁸ It is not possible to track residential lighting participation by customer account but it is assumed that there is overlap between Home Energy Report participants and residential lighting participants. Therefore, for the purpose of estimating unique participation for illustration in these graphs, only include Home Energy Report participation is included in the 82%.

drives customers to participate in other energy efficiency programs.¹⁹ Planned 2017 and 2018 participants are also included in these graphs for illustrative purposes.



*2017 and 2018 planned values are preliminary until the year-end reports are finalized and duplicate participation across programs and years can be applied. Home Energy Reports participation is adjusted by the "Read Rate" of 75% from the most recent Customer Engagement Tracker Surveys.



*2017 and 2018 planned values are preliminary until the year-end reports are finalized and duplicate participation across programs and years can be applied. Home Energy Reports participation is adjusted by the "Read Rate" of 75% from the most recent Customer Engagement Tracker Surveys.

¹⁹ The full participation analysis can be found in Docket 4580 - National Grid Electric and Gas Energy Efficiency Programs 2016 Year-End Report, filed May 1, 2017.

In 2018, the Company will work to reach even more unique customers, or those that have never participated in its energy efficiency programs, and customers that have previously participated that can still benefit from the installation of additional energy efficiency measures. Many of the unique participants captured above are still eligible for additional programs, for example a participant in the EnergyWise Single Family program may participate in the HVAC program.

In an effort to increase participation in its energy efficiency programs, the Company contracted with a third party to assess customer participation in its residential and small business programs.²⁰ The study characterized customers that participate in energy efficiency programs and identified non-participants that are likely to participate in each of the programs. The study also identified customer segments that are underrepresented and derived targeting strategies and recommendations that may increase participation rates. The Company will use the results of this study to try to reach customers that have not yet participated. The study will be submitted as part of the filing of this Plan.

To provide more detail on trends in participation, the Company will again provide a detailed analysis in its 2017 Year-End Report showing additive and cumulative portfolio participation.

e. **Equity**

The 2018 Annual Plan is designed to reach as many customers as possible and to provide energy efficiency services to all customer classes. Since each customer pays into the energy efficiency programs, the Company designs programs to allow for all customers to participate and receive benefits. All customers, regardless of participation, benefit from energy efficiency financially because of lower future costs of energy – this is demonstrated through the bill impact analysis and described in detail in other sections of this Plan.

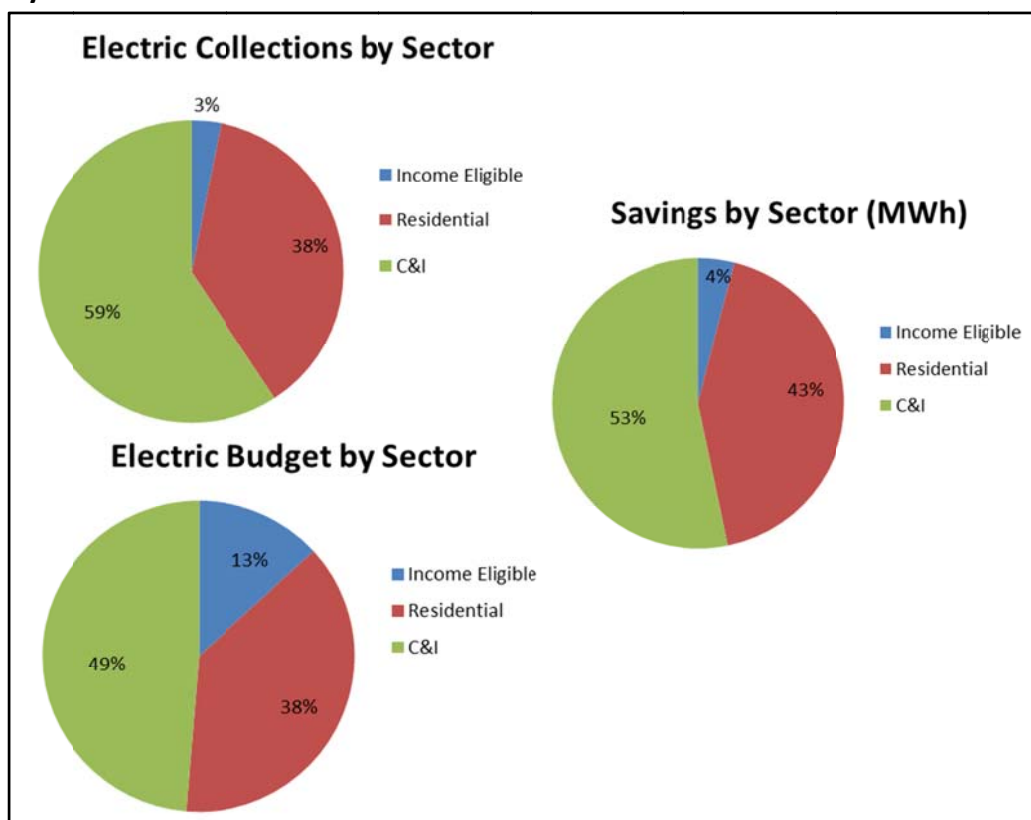
The pie charts below are a graphical representation of Attachments 5 and 6, Tables E-1 and G-1. The Company first provided these charts at the 2017 Annual Plan hearing and has included them again in this Plan to better display the difference between customer class rates, budgets, and savings.

As shown in Graph 6, there is parity between the collections by a customer class and its resulting budget and savings in the electric portfolio. The only exception is the income-eligible sector where there is an established agreement amongst the Parties that the

²⁰ The programs in this study include EnergyWise Single Family, Income-Eligible Single Family, EnergyWise Multifamily, Income-Eligible Multifamily, Residential New Construction and Small Business Direct Install.

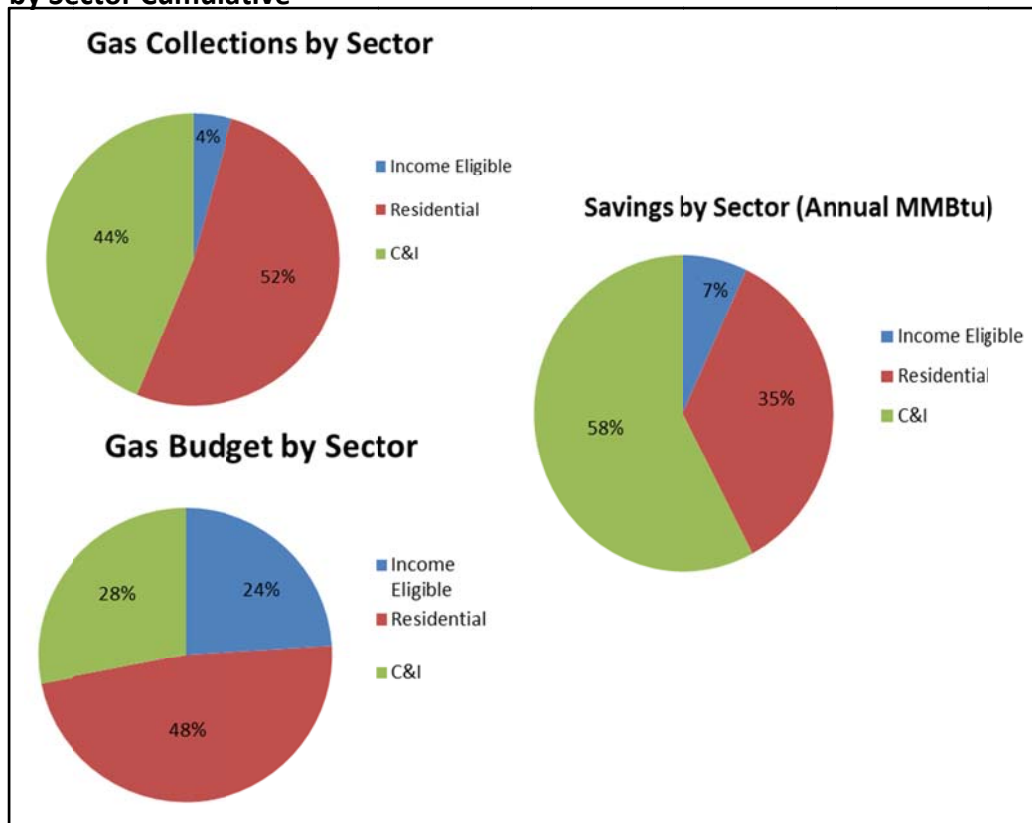
residential and C&I customer classes use part of its collections to help cover the income-eligible sector funding needs. The income-eligible budget is higher compared to its savings due to several factors: incentives are 100% of the cost, the programs are more expensive because they are delivered in-home (compared to at retail sites or via rebates) which requires more labor and management, and the programs also have fewer economies of scale (compared to C&I).

Graph 6: Graphical representation of Attachment 5 Table E-1 and total Electric Savings by Sector Cumulative



For the gas portfolio, there is also parity between the collections by a customer class and the resulting savings. There is less parity between budgets and savings. This is due to several reasonable factors. First, the EE Program Charge varies by customer segment, which changes collections. Second, C&I projects tend to create more savings per dollar. That is due to larger economies of scale, larger projects, different delivery channels that require less labor or management and are more cost-effective, evaluation factors such as free-ridership and spillover, and different customer opportunities.

Graph 7: Graphical representation of Attachment 6 Table G-1 and total Electric Savings by Sector Cumulative



f. Creating and Sustaining Energy Jobs

Delivery of energy efficiency savings is a large effort, involving a large number of people. One of the most evident economic benefits that energy efficiency creates in RI is the number of jobs created or sustained in the energy sector. Each year, National Grid reports on the number of jobs supported by its RI energy efficiency programs. The report is included in National Grid's Year-End Report, which is submitted to the PUC, and available on the Council's website. The 2016 report found that the energy efficiency programs supported 702 full-time equivalent (FTE) workers across 923 different firms, 82% of which were located in Rhode Island.

State policies promoting energy efficiency have enabled a rapid growth in energy efficiency jobs across job functions and skill levels throughout the state, especially among small businesses. Together with partners, National Grid will explore opportunities for engaging local businesses and employers in a conversation about economic development, growth opportunities, and policies that will grow and sustain local jobs in the future. The opportunities will take shape in 2018 and may include creating a forum or working group for business to come together.

Additionally, National Grid has conducted a number of workforce development activities throughout the state that it will continue in 2018. Examples of the Company's activities include the Codes Initiative, which offers continuing education credits related to energy codes for design and construction professionals. In order to help our contractors develop the skills needed to effectively deliver our programs, the Company has also conducted the following trainings: code training for residential new construction; in-field technical training for residential new construction; weatherization training for our Community Action Partners and their weatherization staff; and technical training for HVAC contractors. Additionally, the Company offers professional certifications for facility managers through its Building Operator Certification course, which teaches energy efficient techniques for optimizing energy management. National Grid also sponsors the Rhode Island Home Show, and in 2018, the show will promote job and workforce development.

g. System Reliability Procurement

In a contemporaneous filing, the Company is submitting its System Reliability Procurement (SRP) Annual Report for 2018 for the PUC's review and consideration. The SRP Annual Report describes the strategies, goals, and funding request for SRP in 2018. The SRP Factor is included as part of the total EE Program Charge shown on line 14 of Table E-1 in Attachment 5. For 2018, the charge is \$0.0 due to a positive SRP fund balance.

5. Funding and Budgets

Funding, budgets, goals, and cost-effectiveness information is provided in Attachment 5 for the proposed electric energy efficiency programs and in Attachment 6 for the proposed natural gas energy efficiency programs.

a. 2018 Annual Plan Funding Sources

The sources of funding and the amounts of the funding proposed for the cost-effective 2018 EE Programs are shown in Table E-1 for electric programs and Table G-1 for natural gas programs.

The sources of funding for the 2018 electric programs are shown in Attachment 5, Table E-1. To collect these funding sources for the 2018 cost-effective programs, the Company proposes: (1) one line on the customers' bill labeled "Energy Efficiency Charge" at \$0.01000 per kWh, as calculated in Attachment 5, Table E-1 (composed of the existing energy efficiency program charge of \$0.01124 per kWh minus a fully reconciling funding mechanism charge of \$0.00124 per kWh in accordance with the requirements of R.I.

Gen. Laws § 39-1-27.7); (2) projected Large C&I commitments from 2017, if any; (3) projected carryover of the year-end 2017 fund balance, as applicable, including interest at the rate in effect for customer deposits; (4) forecast revenue generated by ISO-NE's Forward Capacity Market (FCM); and (5) anticipated revenues generated through RGGI permit auctions. Funding sources do not include revolving loan funds.

The sources of funding for the 2018 natural gas programs are shown in Attachment 6, Table G-1. The Company proposes that the 2018 budget should be funded from the following sources: (1) one line on the customers' bill labeled "Energy Efficiency Charge" at \$0.898 per dekatherm for residential customers and \$0.727 per dekatherm for non-residential customers as calculated in Attachment 6, Table G-1 (composed of the existing energy efficiency program charge of \$0.888 per dekatherm plus a fully reconciling funding mechanism of \$0.010 per dekatherm for residential customers and the existing energy efficiency program charge of \$0.726 per dekatherm plus a fully reconciling funding mechanism of \$0.001 for non-residential customers in accordance with the requirements of R.I. Gen. Laws § 39-1-27.7); (2) projected carryovers or under-recoveries of the year-end 2017 fund balance, including interest at the rate in effect for customer deposits; and (3) low income weatherization funding in base rates. Funding sources do not include revolving loan funds.

The 2018 budgets for cost-effective electric and natural gas efficiency investments are dependent on a number of projections that inform the amount of funding, including projections of kWh or therm sales of electricity and natural gas, year-end 2017 large C&I program commitments, capacity payments received from ISO-NE (electric only), and year-end 2017 spending. The Company estimates that the electric projected fund balance at year-end 2017 will be \$8.9 million, as shown in Attachment 5, Table E-1; the gas fund balance at year-end 2017 is estimated to be negative \$2.3 million, as shown in Attachment 6, Table G-1.

Other considerations regarding funding sources include:

i. ISO-NE Capacity Market Revenue

Consistent with the PUC's Standards, the 2018 Annual Plan, and PUC decisions regarding Annual Plans since 2008, the Company and the Parties agree that kW-demand savings achieved via the electric energy efficiency and Combined Heat and Power programs continue to participate in the FCM as Passive On-Peak Demand Resources. The Company will manage and direct the revenues by bidding the demand savings attributed to energy efficiency measures and Combined Heat and Power facilities in the FCM and managing the associated capacity resources to maximize the resulting FCM revenue.

The revenues from measures installed through this Plan, as well as all previous Plans, will continue to be reinvested in energy savings for the life of the measure.

The Parties fully agree that the Company should recover all prudently incurred FCM expenses from ISO-NE capacity-payment revenue generated by the demand savings from efficiency programs represented by the Company. The Company expects that capacity payments received from the ISO-NE will exceed its administrative and Measurement and Verification (M&V) compliance costs of participation in the FCM, and will result in additional funds being made available to fund efficiency programs for customers. If these participation costs exceed the capacity payments, the Parties agree that the Company may recover its prudently incurred costs from the energy efficiency program fund. The Parties reserve the right to examine the actions and expenses of the Company to ensure that only prudently incurred expenses are deducted from ISO-NE capacity payments or the energy efficiency program fund.

In addition, as part of the FCM, all qualified auction participants are required to post Financial Assurance to provide security that the promised resource will deliver the promised MW at the promised time. If, as a result of circumstances beyond the Company's control,²¹ the Company is unable to provide all or a portion of the megawatts of capacity proposed in its qualification packages and capacity auction bids, some or all of the financial assurance monies would be forfeited.

ii. Exceptions to the Natural Gas Energy Efficiency Program Charge

All natural gas used for distributed generation projects approved since 2014 will be subject to the gas energy efficiency surcharge.²²

The 2006 Act allows the PUC to exempt natural gas used for manufacturing processes from the energy efficiency surcharge where the customer has established a self-directed program to invest in and achieve best effective energy efficiency in accordance with a plan approved by the PUC and subject to periodic review and approval by the PUC. Consistent with prior PUC decisions, the Parties have developed recommendations for a process under which a manufacturer may submit its self-directed program and the

²¹ Such circumstances may include legislative action to alter the EE Program Charge or discontinue the Company's authority to implement the energy efficiency programs underlying the Qualifications Package or a PUC decision limiting the Company's role in bidding the demand savings acquired through program efforts into the FCM.

²² Natural gas used for distributed generation (excluding natural gas used by emergency generators) for distributed generation projects approved under the energy efficiency programs in 2013 and prior years - independent of the date those facilities become commercially operable - are not subject to the energy efficiency surcharge when natural gas used for that purpose can be clearly identified through uniquely metered use and when so requested in writing by the customer.

required annual reports for approval. The Parties recognize that this process may need to be reviewed and modified after the PUC has accumulated sufficient experience with these programs. Any customer that receives this exemption from the natural gas energy efficiency program charge will not be eligible to receive energy efficiency program services.

iii. 2018 State Appropriations Legislation

On August 3, 2017, the Governor of Rhode Island signed RI H5175, "Relating To Making Appropriations For The Support Of The State For The Fiscal Year Ending June 30, 2018." This legislation includes the following language pertaining to the state budget for fiscal year 2018 on page 36:²³

"SECTION 17. Notwithstanding any provisions of Chapter 2 in Title 39 of the Rhode Island General Laws, the Electric and Gas Distribution Company shall transfer to the State Controller the sum of twelve million and five hundred thousand dollars (\$12,500,000) by June 30, 2018 from the Public Utilities Commission approved 2018 System Reliability and Energy Efficiency and Conservation Procurement Programmatic Budget Plan."

To comply with this law, the Company proposes to transfer \$12.5 million to the RI General Fund after the PUC approves this Plan. The transfer has been accounted for on line 7 of Table E-1. The impact of this transfer is an increase in the EE Program Charge of \$0.00174 per kWh for all electric customers.

The payment is not included in cost-effectiveness screening, the RI Test, because it does not meet the definition of costs as described in Attachment 4 of this Plan which is derived from the requirements of Least Cost Procurement in R.I. Gen. Laws § 39-1-27.7(a)(2) and (c)(5). Specifically, the payment to the state budget does not contribute to the implementation of energy efficiency measures and programs nor does it represent the customer's contribution to the installation cost of energy efficiency measures. For these reasons, it is not included as a cost in determining cost-effectiveness, nor is it included in the calculation of the shareholder incentive.

b. Budgets

The Parties agree that the portfolio of energy efficiency programs and services for 2018 will have an overall budget of approximately \$94.6 million for electric programs and

²³ Full Bill available at: <https://legiscan.com/RI/text/H5175/id/1636288>

\$28.1 million for natural gas programs. The Parties agree to segment the budget into three sectors: residential income eligible, residential non-income eligible, and commercial and industrial (C&I). Proposed sector and program budgets are provided in Attachment 5, Table E-2 and Attachment 6, Table G-2. The derivations of the spending budget and implementation expenses are illustrated in Attachment 5, Table E-3 and Attachment 6, Table G-3. A comparison of these proposed budgets to the 2017 budget is provided in Attachment 5, Table E-4 and Attachment 6, Table G-4.

The Parties agree that the Company should make every attempt to spend or commit all the funds available for energy efficiency during the program year, including any increases in the fund balance due to increased sales or other factors. Although this Plan includes a projection of the fund balance expected at year-end 2017 as a funding source (or deficit) to carry into 2018, it is likely that the actual year-end 2017 fund balance will be more or less than that amount. Within 30 days after the filing of the 2017 Year-End Report, the Company will calculate the difference between the actual year-end fund balance and the projected year-end fund balance included in this Plan. If excess funds are available, the Company is permitted to move the excess funds into financing mechanisms for the sectors in which the excess occurs, support possible overspending during the year, reduce the energy efficiency program charge, or carry the excess funds over into the next program year. The Company will include a description and reflect the application of excess funds in quarterly reports, annual reports, and Annual Plans as applicable. If the use of the funds supports overspending of current year program budgets, then, in addition to the above requirements, the Company will follow the provisions for overspending in Section D, below. Use of excess funds for financing mechanisms will not be considered as overspending.

The Parties also agree to review the status of budgets regularly to assess whether they are likely to come to a successful completion. If not, the Parties agree to review the advisability of transferring funds to other programs where the money could be more effectively used. Fund transfer guidelines are presented in Section C, below.

The Company proposes to continue the practice of funding commitments that were established in the 2014 Plan, Docket 4451. Namely, the Company will continue to make commitments for projects with a projected incentive in excess of \$3 million.²⁴ For all other projects, except those with incentives greater than \$3 million, there would be no

²⁴ As noted below in Section D, the Company will be required to notify the PUC of all incentive offers in excess of \$3 million. Such notifications will also include a description of how the Company intends to fund the incentive.

commitment budget and the Company will fund and pay all incentives in the year in which they are completed.

c. Transferring Funds

The Parties will regularly review the amount of funds needed and available for each program (as well as any changes to the overall fund balance, as discussed in Section III.A above) and will transfer monies as needed. Transfers during the program year may occur as follows:

- i. Transfers within a Sector: For transfers of less than 20% of the originating program's budget, the Company can transfer funds from one program to another program in the same sector. For transfers of 20% or more of the originating program's budget, the Company can transfer funds from one program to another program in the same sector with the Division's prior approval. Upon seeking the Division's approval, the Company shall simultaneously notify the EERMC and OER. For all transfers in a sector, the Company will reflect changes in the quarterly report(s) following the transfer and the year-end report.
- ii. Transfers between Sectors. The Company can transfer funds from one sector to another sector with the Division's prior approval. Upon seeking the Division's approval, the Company shall simultaneously notify the EERMC and OER. If a transfer reduces the originating sector's budget by more than 20% in aggregate over the course of the program year, the transfer will also require PUC approval. For all transfers between sectors, the Company will reflect changes in the quarterly report(s) following the transfer and the year-end report.
- iii. Transfers among residential retrofit programs. The Company can transfer among EnergyWise, EnergyWise Multifamily, Income Eligible Multifamily, and C&I Multifamily (which are in different sectors) programs in order to achieve the overall savings goals of all programs. Although these are listed as separate lines in the program tables, they are essentially one program from an implementation standpoint. For all transfers between residential retrofit programs, the Company will reflect changes in the quarterly report(s) following the transfer and the year-end report.
- iv. For transfers requiring Division and/or EERMC, but not PUC approval, the Parties will inform the PUC of the transfers, both between sectors and within sectors, in a timely fashion.

- v. The Company will not be permitted to adjust its goals or incentive target calculations as a result of any transfers between sector budgets. However, after any budget transfers between sectors are made, the sector spending budgets will be recalculated for the purposes of the shareholder incentive calculation.

d. Budget Management

It is possible that there could be deviations from the planned budget for 2018 that could occur during the program year. The Parties contemplate three scenarios, and have agreed to address them as follows:

1. The Company's expenditures and commitments for 2018 may exceed the total budget by up to 15% so long as a written explanation is provided to the EERMC and the PUC for any deviation and the expenditures and commitments are reasonably consistent with the original 2018 plan.
2. The Company agrees that, during 2018, if the Company anticipates that continued operation of its programs is likely to result in actual expenditures and commitments exceeding the total budget by more than 15%, the Company will seek a vote of approval from the EERMC at its next meeting. Following EERMC action, the Company will be required to obtain approval from the PUC for expenditures in excess of 15% higher than the total budget, which would be collected through reconciliation in the next year's Energy Efficiency Program Charge.
3. During a program year, if the Company did not anticipate that its actual expenditures and commitments would exceed the total budget by more than 15%, but actual expenditures and commitments do exceed such threshold, the Company will bear the burden of demonstrating the reasonableness of its actions, including an explanation of why the over-spending occurred and how the expenditures and commitments are reasonably consistent with the original plan. Such demonstration would be required to be part of the 2018 Year-End Report, if not sooner.

In each of these three instances, the PUC retains its traditional ratemaking authority to review the prudence and reasonableness of the Company's actions.

In addition, the Company will file a written notification with the PUC of any energy efficiency incentive annual offer in excess of \$3 million. The project, the incentive, and any other related proposals will be authorized to proceed after thirty days from the notice filing unless the PUC suspends the filing and/or issues

an order within such 30-day period to extend the time for purposes of further review.

If the dollar value of a proposed incentive for a single project is such that it would cause a program to exceed the overall energy efficiency plan budget for the current program year, the Company will follow the provisions related to overspending, per the rules established above.

6. Goals and Cost-Effectiveness

The Company has projected cost-effectiveness for the proposed 2018 programs using the RI Test. The use of the RI Test was required by the Standards, as revised by the EERMC, and approved by the PUC at the Open Meeting on April 27, 2017 in Docket 4684. The RI Test requires that the total lifetime savings from the efficiency measures will exceed the total costs of the measures (i.e., program and customers' costs).

As provided for under the Standards, benefits include primary fuel energy savings (electricity and natural gas), the value of other resource (fuel and water) benefits, price effects, non-embedded greenhouse gas reduction benefits, economic development benefits, and non-energy impacts (NEIs). Costs include all projects costs, as well as program planning and administration, sales, technical assistance and training, and evaluation. To illustrate the detailed components of the RI Test as well as the sources of the values, the Company has provided Attachment 4.

Two key supporting documents for cost effectiveness are the Technical Reference Manual and the Avoided Cost Study. For the 2018 Annual Plan, the Company developed the 2018 Rhode Island Technical Reference Manual (TRM), which documents the savings or savings algorithms and costs for measures proposed to be offered through its programs in 2018. The TRM identifies the sources for the savings estimates: evaluation studies, engineering analyses, and/or other research. This TRM is a public document and was provided to the EERMC and its consultants to support and facilitate the determination of the Plan's cost-effectiveness. It will be available at <https://www.nationalgridus.com/EnergyEfficiencyReports.asp>. The TRM is reviewed and updated annually to reflect changes in technology, baselines, and evaluation results.

The cost-effectiveness analyses of the proposed programs use avoided energy supply costs that were developed by Tabors, Caramanis, and Rudkevich (TCR) as part of the Avoided Cost Study, "Avoided Energy Supply Costs in New England: 2015 Report," that was sponsored by all the electric and gas efficiency program administrators in New

England and was designed to be used for cost effectiveness screening in 2016 through 2018.²⁵ In the fall of 2016, TCR prepared a limited update of Appendices B (Avoided Electricity Cost Results), C (Avoided Natural Gas Cost Results), and D (Avoided Electricity Cost Results) in the report for Maine, New Hampshire, Rhode Island, and Vermont based on new estimates for six categories of inputs starting in 2017 that the Company applied to the 2018-2020 Three-Year Plan and this 2018 Annual Plan. These avoided costs reflect current and expected market conditions and are highly influenced by the cost of fossil fuels and expectations about ISO-NE's emerging forward capacity market. Company-specific transmission and distribution capacity values are also included. The avoided costs from the report used for 2018 are shown in Attachment 5, Table E-8 and Attachment 6, Table G-8. There were several noted changes to the avoided costs in the 2015 study update. Futures prices for natural gas at the Henry Hub are approximately 20% less than the AESC 2015 levelized costs for 2016-2025. These lower prices have a downward impact on avoided wholesale electric energy costs as well as on avoided costs of natural gas by end-use. The Update also projects lower avoided wholesale electric capacity costs. Avoided capacity costs are approximately 15% lower due to the assumed procurement of incremental supply of hydro power from Canada, offshore wind, and renewables that create a multi-year capacity surplus. Due to all these factors the avoided costs benefits have decreased in 2018 compared to 2017.

Attachment 5, Table E-5 and Attachment 6, Table G-5 provide the calculations of 2018 program year cost-effectiveness. Attachment 5, Table E-6 and Attachment 6, Table G-6 show the energy savings goals based on the proposed budgets. Attachment 5, Table E-7 and Attachment 6, Table G-7 show a comparison of the goals with the approved program goals from 2017. Attachment 5, Table E-5 shows that the proposed portfolio of electric programs is expected to have a benefit/cost ratio of 2.84, which means that approximately \$2.84 in benefits is expected to be created for each \$1 invested in the programs. Attachment 6, Table G-5 shows that the proposed portfolio of gas programs is expected to have a benefit/cost ratio of 2.76, which means that \$2.76 in benefits is expected to be created for each \$1 invested in the programs. This increase in efficiency investment continues the progress of acquiring all energy efficiency resources that are cost-effective and lower cost than supply.

²⁵ The report is available online at: <http://ma-eeac.org/wordpress/wp-content/uploads/2015-Regional-Avoided-Cost-Study-Report1.pdf>. This study forecasts avoided costs for three years, compared to prior studies which developed avoided costs applicable to a two-year period.

7. Bill Impacts

In addition to energy efficiency being a cost effective investment for Rhode Island, an analysis of bill impacts from the proposed investment in energy efficiency indicates that the average Rhode Islander who participates in the electric programs will realize a bill reduction of 1.56% to 15.80%, depending on rate class. The participant in the gas programs will see a bill reduction of 0.93% to 8.28%, depending on rate class. The average Rhode Island consumer (blending participants and non-participants) will see reduced bills of 0.81% to 3.47% for electricity over the lifetime of the installed energy efficiency measures, compared to no investment. For gas bills, the average Rhode Island consumer will see 0.01% to 1.75% reduction, depending on rate class. The bill impacts analysis uses models that were first used in the 2015 Plan and considers bill savings to participants compared to the incremental cost to all consumers of investing in energy efficiency in 2018. It also factors in that non-participants will benefit through avoided infrastructure investments as well as market effects. The full bill impacts analyses for electric and gas programs may be found in Attachment 7.

8. Measurement and Verification Plan

To verify the impacts that programs are having on energy savings, the Company hires independent consulting firms to regularly conduct program evaluations as part of its measurement and verification process. These evaluations include engineering analysis, metering analysis, billing analysis, site visits, surveys, and market studies to realize the actual energy savings that particular measures are having. Every year, the results of the surveys are used to update the benefit-cost calculations during planning. Attachment 3 lists the evaluations that have occurred since 2007, that are still being used, and their influence on program planning.²⁶ The executive summaries of recently completed evaluations are submitted electronically to the PUC; executive summaries of evaluations completed in prior years are available in the dockets for previous years, or upon request.

Additionally, the M&V Plan for 2018 is presented in Attachment 3, and includes brief descriptions of each of the proposed studies. The areas proposed for study in 2018 have been chosen based on a number of factors: the relative amount of savings in that program or end use, the vintage of the most recent evaluation study, the relative precision of the recent evaluation study, and the available evaluation budget. In

²⁶ The information in the Attachment is also intended to meet the specific requirement from the 2016 EE Program Plan to provide “a summary of evaluation results obtained since October 1, 2015, together with an attachment summarizing the impact of those results in planning the Company’s 2018 programs.”

addition, some new program areas are designated for both impact and process evaluations. This list may be added to as the year progresses and different evaluation priorities are identified. In particular, the parties will consider the value of using evaluations from other jurisdictions as well as adding Rhode Island-specific impact or process evaluations, as appropriate, that will help inform the Company's efforts towards achieving the goals of least cost procurement.

9. Reporting Obligations

- a. During 2018, the Company will provide quarterly reports to the EERMC, the Division, OER, the Collaborative, and the PUC on the most currently available program performance for both natural gas and electric efficiency programs. These reports will include a comparison of budgets and goals by program to actual expenses and savings on a year-to-date basis, and a status report on revolving loan funds. The Company will also coordinate reporting of loan funds with the Rhode Island Infrastructure Bank. The reports will also include a brief summary of program progress and will highlight issues by sector for EERMC, Division, OER, and Collaborative attention. Within the C&I sector, there will be separate highlighting of large and small customer program progress and issues. Beginning in the second quarter, the quarterly reports also include a forecast of expected results.
- b. During 2018, for months for which quarterly reports are not produced, the Company will provide to the EERMC, the Division, and the Collaborative monthly summaries of year-to-date spending and savings and results by sector.
- c. The Company will provide to the Parties and file with the PUC its 2018 Year-End Report no later than May 1, 2019. This report will include achieved natural gas and electric energy savings in 2018 and earned incentives for 2018.
- d. The Company will provide the Parties with a summary of evaluation results obtained since October 1, 2016, including a description of the impact of those results in planning the Company's 2018 programs, in the 2018 Plan to be filed by November 1, 2017.

10. Incentive

Consistent with the Three-Year Plan, the proposed shareholder incentive mechanism for 2018 will be based on the same metric applicable to the 2017 Plan. Under the current incentive structure, the Company can earn a target based-incentive rate equal to 5.0%

of the eligible spending budget in a program year for achieving electric and gas energy savings goals.

- For electric savings, the Company can earn a target-based incentive rate equal to 3.5% of the eligible annual spending budget for achieving MWh savings goals and 1.5% of the annual spending budget for achieving MW savings goals.
- For gas, where there is no demand savings component, the Company can earn a target-based incentive rate equal to 5.0% of the eligible annual spending budget for achieving MMBtu savings goals.

As in 2017, the proposed incentive mechanism establishes an incentive of 1.25% of the annual spending budget for achieving 75% of the savings goals in a sector. This would increase linearly to 5% of the annual spending budget for achieving 100% and increase linearly from that point to 6.25% of the annual spending budget for achieving 125% of the savings goals.

Expressed mathematically, the shareholder incentive would be calculated as follows for both energy and demand savings, where SB is the Annual Spending Budget in the sector:

- From 75% of savings to 100% of savings:
 - Incentive = $SB \times (0.15 \times \% \text{ of savings achieved} - 0.10)$
 - x 0.7 for electric energy savings
 - x 0.3 for electric demand savings
 - x 1.0 for natural gas savings
- From 100% of savings to 125% of savings:
 - Incentive = $SB \times (0.05 \times \% \text{ of savings achieved})$

The Company believes that this structure will incent the Company to achieve savings that approach or exceed 100% of the annual goals. It does so by setting the threshold for savings required to earn an incentive at 75% of the annual savings goals, by creating a steep slope to earn a greater incentive in the range of 75% of savings to 100% of savings, by establishing the target incentive at 5.0% of the annual spending budget, and by offering a higher incentive for exceeding 100% of the annual goals.

The threshold performance level for energy savings by sector will be set at 75% of the annual energy and demand savings goal for the sector. The Company must attain at least this threshold level of savings in the sector before it can earn an incentive. The Company will have the ability to earn an incentive for each MWh, MW or MMBtu saved, once threshold savings for the sector are achieved. The cap for the target incentive amount of energy savings will remain at 125%.

The ability to earn up to 125% of the target incentive is worthwhile because Rhode Island customers will realize additional energy and cost savings if the Company achieves a high level of energy savings performance. Given budget control requirements, this feature will provide the Company with an incentive to improve the efficiency of its program implementation efforts while providing Rhode Island customers with value in excess of the incremental incentive that may be earned by the Company. That is, the Company will have an incentive to increase customers' savings and customers will realize an overwhelming majority of the savings.

The savings goals are based on a set of assumptions of savings per measure and other impact factors in each program as well as the proposed budget. The determination of achieved savings will be based on the same set of savings and impact assumptions as is used to develop the savings goal in this Annual Plan. These assumptions have been reviewed and accepted by the Parties.

Attachment 5, Tables E-3 and Attachment 6, Table G-3 provide the derivations of the eligible electric spending budget that are used to determine the incentive amounts that the Company may earn if it is successful in achieving its goals for energy savings. Attachment 5, Table E-9 and Attachment 6, Table G-9 provide a summary of the incentives related to annual energy-savings goals by sector. These goals by sector reflect the expected cost of savings in each sector informed by evaluation studies, and these goals have been adjusted to take into account changing rebate policies and the changing market being served. As described above, these goals have been carefully reviewed by the Collaborative and EERMC representatives to ensure that they represent reasonable and challenging goals for the year.

For electric energy efficiency programs, the proposed target base-incentive rate in 2018 is equal to 5.0% of the eligible spending budget for 2018. The projected electric eligible spending budget for 2018 is approximately \$88.7 million (see Attachment 5, Table E-3). The total electric target incentive for 2018 is 5.0% of the proposed spending budget, or approximately \$4.4 million (see Attachment 5, Table E-9).

For natural gas efficiency programs, the proposed target base incentive is equal to 5.0% of the eligible budget. The projected natural gas eligible spending budget for 2018 is approximately \$26.2 million (see Attachment 6, Table G-3). The total natural gas target incentive for 2018 is 5.0% of the proposed spending budget, or approximately \$1.3 million (see Attachment 6, Table G-9).

In addition, to promote cost efficiency in spending in the achievement of the energy savings goals, an adjustment will be made under certain circumstances to MWh and MMBtu savings goals in the shareholder incentive calculation. If the actual

implementation expenses in a sector at year-end are less than the planned implementation expenses for that sector by more than five percent, and if achieved savings in the sector exceed 100% of the target savings goal, the savings goal for that sector will be adjusted by the ratio of actual implementation expenses to the planned implementation expenses. Conversely, if the actual implementation expenses²⁷ in a sector at year-end are greater than the planned implementation expenses by more than five percent, and if achieved savings in the sector are less than 100% of the target savings goal, the savings goal for that sector will be adjusted by the ratio of actual implementation expenses to the planned implementation expenses.

The Company will report final program results and earned incentive in its Year-End Report regarding 2018 Energy Efficiency Program efforts.

As indicated in the Three-Year Plan, the Company will also work with the OER, the DPUC, the Council and the Collaborative during 2018 to consider new performance metrics for future Annual Plans to align energy efficiency plans with the state's goals for power sector transformation and greenhouse gas emissions reduction.

11. Miscellaneous Provisions

- a. Other than as expressly stated herein, this Settlement establishes no principles and shall not be deemed to foreclose any party from making any contention in any future proceeding or investigation before the PUC.
- b. This Settlement is the product of settlement negotiations. The content of those negotiations is privileged and all offers of settlement shall be without prejudice to the position of any party.
- c. Other than as expressly stated herein, the approval of this Settlement by the PUC shall not in any way constitute a determination as to the merits of any issue in any other PUC proceeding.
- d. The Parties agree that the Collaborative shall meet no less than six times in 2018 to review the status and performance of the Company's 2018 energy efficiency programs and advise the Company on potential energy efficiency programs for 2018.

The Parties respectfully request that the PUC approve this Stipulation and Settlement as a final resolution of all issues in this proceeding.

²⁷ Expenses related to overspending for deliverable fuels will be excluded from implementation expenses in this calculation.

Respectfully submitted,
THE NARRAGANSETT ELECTRIC COMPANY D/B/A NATIONAL GRID



10/25/2017

By its Attorney,
Raquel J. Webster

Date

ACADIA CENTER

A handwritten signature in blue ink, appearing to read "Erika Niedowski", written over a horizontal line.

10/25/17

By its Policy Advocate,
Erika Niedowski

Date

RHODE ISLAND DIVISION OF PUBLIC UTILITIES AND CARRIERS

Jon E. Hagopian 10/25/12

By its Deputy Chief Legal Counsel, Date
Jon Hagopian, Esq.

THE RHODE ISLAND ENERGY EFFICIENCY AND RESOURCE
MANAGEMENT COUNCIL



By its Attorney,
Marisa Desautel

Date: 10/24/17

OFFICE OF ENERGY RESOURCES


By its Commissioner,
Carol J. Grant

10/25/17
Date

PEOPLE'S POWER & LIGHT

By its Executive Director,
Larry Chretien

Date

10/20/17

2018 Residential Energy Efficiency Solutions and Programs

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1. Introduction

Rhode Island residential customers place a great deal of trust in National Grid. They look to the Company to keep their homes comfortable, their lights on, and to be there in moments of crisis. The Company takes this charge incredibly seriously as it and its employees are part of the very community it serves. As such, the Company is always looking for more ways to provide even greater value to these customers through services that give them control of their energy, help reduce their bills, ensure financial wellbeing, and provide equity for all.

National Grid's Residential Energy Efficiency solutions are one way to contribute to all of the above-mentioned goals. For the customer building a new home, the Company has a program to help you do so in an incredibly efficient manner. For the tech-savvy customer looking to integrate new technologies into their existing residence, the Company works with retail and wholesale channels that sell energy products and provides incentives that help customers get the "latest and greatest", as well as the "tried and true" energy saving devices at an affordable cost. For the customer working two jobs to put their children through school, the Company can help reduce energy bills and increase comfort in the home through its retrofit programs, many times at no-cost at all.

The following sections cover these solutions, the energy saving goals the Company has set for 2018, and how the Company plans to achieve these goals in an ever-changing energy landscape.

In the 2018-2020 Three-Year Plan, the Company noted the confluence of widespread adoption of light emitting diode (LED) technology, reduced manufacturing costs for LEDs, and robust efficiency programs and policies have reduced opportunities for the programs to attribute efficiency savings to lighting, which has been a key source of savings since the energy efficiency program's inception. This market transformation of LED lighting creates a need for increased focus on new energy saving technologies and program design models.

For the Company, 2018 aims to be a transformative year for Rhode Island residential energy efficiency. Smarter products will make their way into the programs; products will be offered mid-stream or upstream; program designs overall will begin a shift towards increasingly customer-centric models (e.g. online sign up forms for assessments); and new ideas will be tested to better understand how customers interact with their

products and energy. The Company is excited to bring this new energy future to its customers.

The 2018-2020 Three-Year Plan details four central principles that encompass an advanced and innovative approach to serving all residential customers. The Company finds that these four principles are apparent in all aspects of the 2018 Plan and incorporates the planning process, which included many brainstorming sessions from internal teams to external stakeholders. In addition, each of the Company's strategies, programs, and initiatives are focused on meeting the needs of customers, the environment, and preparing for the future. Below are the four key priorities the Company has identified for the 2018-2020 Plan.

Customers - Deliver comprehensive services encompassing all market segments and customers. Such services will enable customers to control their energy use, reduce their bills, and help support their financial well-being.

Least Cost - Deliver energy efficiency services as cost-effectively as possible through optimizing finance and promoting upstream initiatives. Continuing to deliver cost effective energy saving under Least Cost Procurement will create cost savings to all customers, while creating economic benefits that create and maintain local jobs and businesses. Demand Response efforts will also contribute to cost savings to all customers.

Environment - Provide solutions that minimize greenhouse gas emissions and contribute to Rhode Island's clean energy policy goals, including the Resilient Rhode Island Act.

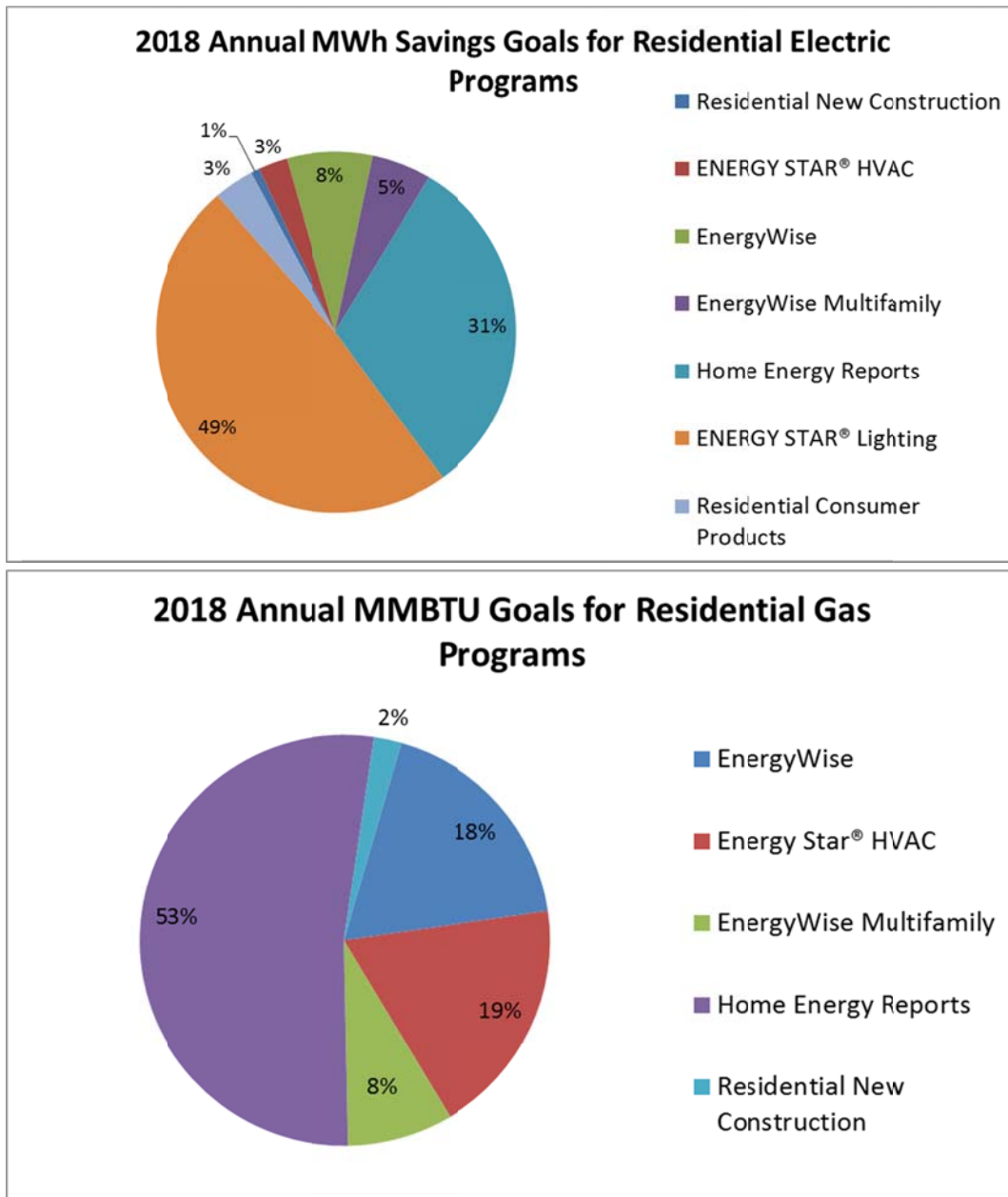
Future – Innovate to capture savings from new technologies and strategies to position energy efficiency programs for the future including the integration of energy efficiency with demand response, renewable energy, and smart grid technologies. This includes incorporating outcomes from the Rhode Island Power Sector Transformation Initiative and Docket 4600.

a. Solutions and Programs Featured in Attachment 1

Solutions	Programs Highlighted	New for 2018
Whole House	Single Family and Multifamily retrofit programs where customers experience	<ul style="list-style-type: none">• Online portal for multifamily condos

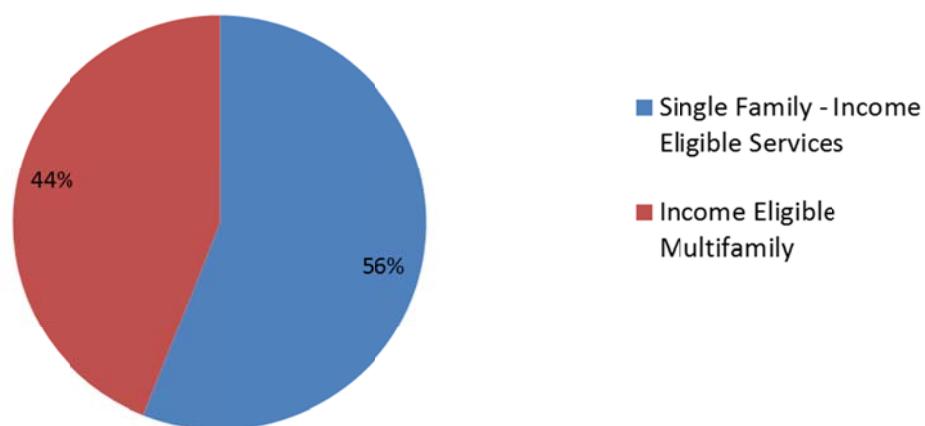
Programs	no-cost assessments and comprehensive upgrades. Also included are the Residential New Construction program, and the Income Eligible Services program.	<ul style="list-style-type: none"> Automated benchmarking for multifamily facilities Multifamily Heat Pump Installations Enhanced delivered fuel incentives Revolving loan fund for Capital Good Fund
Behavior and Products Programs	Home Energy Reports, ENERGY STAR Lighting, Residential Consumer Products, and HVAC programs.	<ul style="list-style-type: none"> Updated HER messaging for income eligible customers National Retail Products Platform Beneficial electrification demonstration within HVAC Upstream Heat Pump Water Heater incentive
Initiatives	The Community-Based Energy Efficiency initiative to educate customers and increase program participation.	<ul style="list-style-type: none"> Updated program design for deeper municipal participation
Residential Demonstration and R&D	Various demonstrations of projects and new technologies such as Home Energy Disaggregation, Automated Lighting controls and more.	
Marketing	Efforts to build awareness, educate customers, and drive participation in the Company's efficiency offerings and services.	<ul style="list-style-type: none"> Energy Innovation Hub

2. Non-Income Eligible Electric and Gas Goals by Program

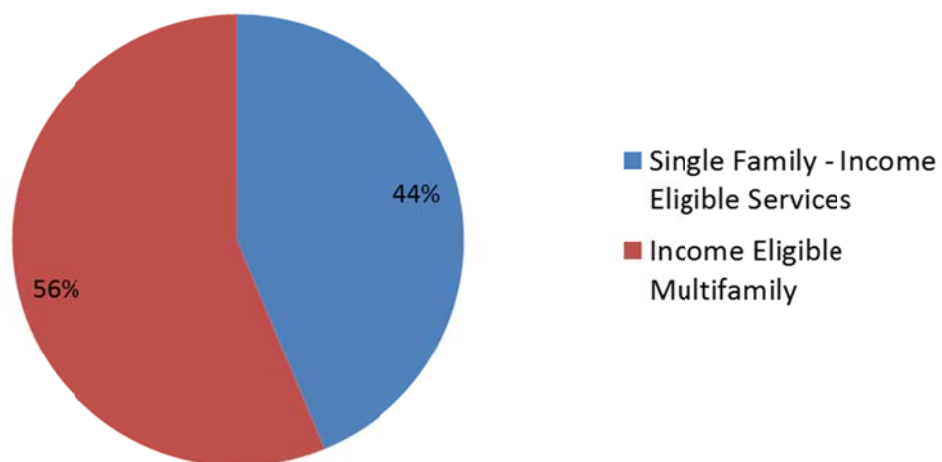


3. Income Eligible Electric and Gas Goals by Program

2018 Annual MWh Savings Goals for Low Income Electric Programs



2018 Annual MMBTU Goals for Low Income Gas Programs



4. Whole House Programs and Solutions

Whole House Solutions provide the most comprehensive level of energy and cost savings for both single family and multifamily customers. For existing homes, the home energy assessment is the first step to identify how much energy the home uses as well as any structural or mechanical problems, that when corrected, save significant amounts of money over time.

The home energy assessment for a single family customer connects energy specialists at a customer's residence to both educate the resident on where the home may be losing energy through air leaks and inefficient energy systems, and to also provide solutions that reduce the energy losses. These solutions require a commitment by the customer in both time and money to the home and may require multiple visits. The end result of implementing all the energy solutions will be a home that is more comfortable and energy efficient.

An initial home energy assessment can take several hours with an energy specialist acquiring information from the homeowner about heating, cooling, and ventilation concerns. Next, the energy specialist conducts a diagnostic assessment of the attic, walls, basement, doors, windows, mechanical systems and appliances to assess existing levels of insulation and air sealing and equipment safety and efficiency. During the initial visit the energy specialist will install no-cost instant savings measures (ISMs) energy saving upgrades including lighting upgrades, pipe insulation, water aerators, and advanced power strips for electronic systems.

If the consumer decides to move forward with recommended energy efficiency solutions identified in the above-described assessment (e.g. insulation, sealing air leaks or heating/cooling system or appliance replacement) additional savings will be realized. Energy efficiency solutions require subsequent visits from a respective service or product provider, and could take several days to complete. While the home energy assessment and ISMs are at no-cost to the customer, the subsequent visits may require a financial investment by the home owner. The company provides financing opportunities and healthy incentives to help the customer move forward with these higher cost measures.

For those customers who reside in multifamily facilities¹ the no-cost assessment experience is still comprehensive, yet the process is a bit different. The Company's Multifamily Coordinator will work directly with property managers, facility owners and/or condominium associations to coordinate the audit and subsequent upgrades. The first on-site assessment will review a representative sample of units to build a plan for retrofit opportunities. The owners and/or tenants are then provided with a list of measures that could be installed in their units and common areas. Incentives are available for weatherization (air sealing, insulation), heating and domestic hot water, cooling, lighting, and appliances.

Residential New Construction offers both technical services and incentives to help customers design and construct new energy-efficient homes. Beginning with a review of plans, the Company's lead vendor can advise a customer how changes in the design can improve efficiency. During construction the vendor works directly with the builder to provide on-site technical support for incorporating best practices and techniques. The program provides HERs rating of the home to determine the energy efficiency upon completion of the project. Incentives are provided based on the HERs rating as well as incentives for high-efficiency heating, cooling and hot water systems.

With a wide variety of customer and site-specific needs, National Grid approaches the whole house solutions market through channels that address the housing structure by number of housing units in the building as well as by income eligibility to ensure as many customers as possible can participate in the program and receive the benefits of energy savings at discounted, low or no cost.

The whole house programs will continue to seek ways to integrate renewable technology in ways that support energy efficiency. Currently the Renewable Energy Growth (RE Growth) Solar Marketplace provides cross-marketing and encourages customers to do an energy assessment prior to adding solar. The RI Office of Energy Resources and CommerceRI Renewable Energy Fund (REF) program requires an energy assessment in order to receive the incentive. The Company will continue to collaborate with both programs and will discuss possible marketing enhancements through digital engagement channels, including web, social media, and email to a general residential customer audience.

¹ The definition of a qualifying multifamily facility can be found in section 6(a) of Attachment 1.

5. EnergyWise Single Family (Electric and Gas)

a. Overview

EnergyWise is the whole home solution that addresses single family (1-4 units in one building), non-income eligible customers. In 2017, EnergyWise received the joint federal Environmental Protection Agency and Department of Energy ENERGY STAR® Partner of the Year Award in Program Implementation for the second consecutive year. The volume of homes served and savings achieved were noted as success factors for the programs. The Rhode Island EnergyWise program in 2016 installed over twenty-five lighting products during home energy assessments. These savings support continued delivery of no-cost first visits to the customer. The combination of instant savings and a no-cost initial visit is a very powerful tool to engage customers in whole home services.

Since 2009, the Company has provided home energy assessments to over 15% of single family, market rate customers in Rhode Island. Customers that have participated in the program learn how their home functions from an energy perspective and are provided solutions to improve energy performance when opportunities exist. EnergyWise participants include renters and homeowners of all heating fuel types. Customers are also able to finance the cost of weatherization improvements through the 0% HEAT Loan.

b. 2018 Goals

The overall goal of EnergyWise is to educate consumers about energy efficiency and introduce instant savings through efficient lighting upgrades, water efficiency solutions, and advanced power strips. Customers can then learn about the areas in their home that could benefit from air leakage reduction and additional insulation (aka weatherization) while experiencing actual energy savings from immediate upgrades. If the customer chooses to invest in weatherization for their homes, deeper energy savings and added comfort can be achieved.

2018 EnergyWise Electric and Gas Goals

Electric

Demand Reduction (Annual kW)	Energy Savings (Annual MWh)	Customer Participation
286	6,157	10,000

Gas

Energy Savings (Annual MMBtu)	Customer Participation
26,787	2,275 *(generally, gas customers are receiving weatherization services and are a subset of the above electric customers)

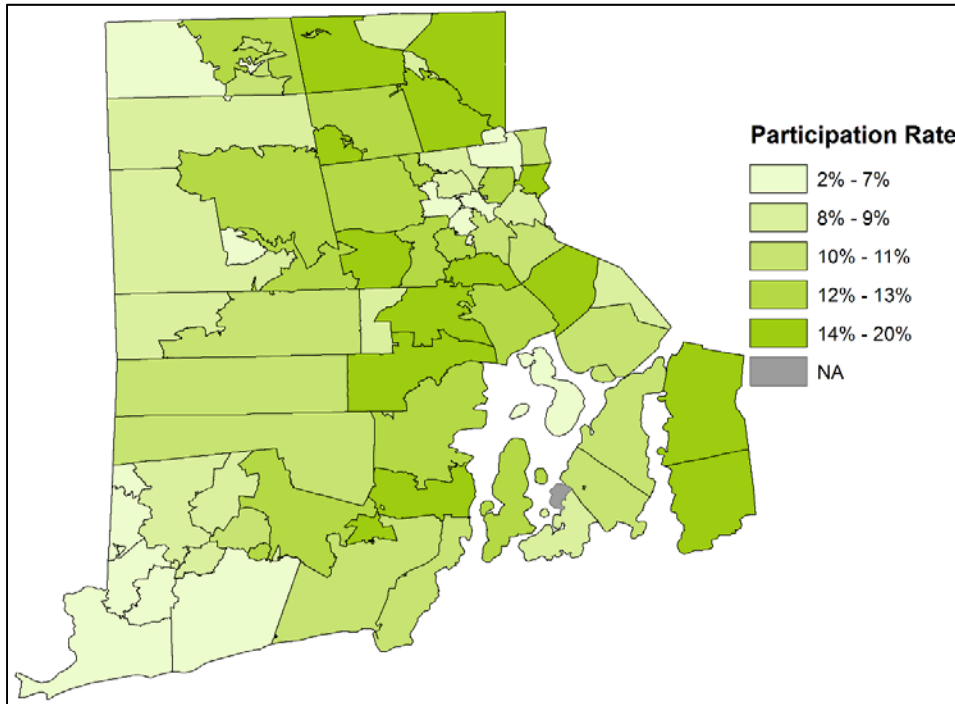
c. How Goals Are Achieved

In 2018 EnergyWise will focus on the following strategies to achieve the aggressive targets:

i. Customers

National Grid conducted a participation study in 2017 to investigate the number of unique customers served from 2009 – 2015 and to the extent possible, demographic and economic factors were observed. Some positive insights from the study showed that all areas of the state have taken advantage of EnergyWise with more activity in the Eastern part of the state. More home owners than renters take advantage of the program as well as homeowners with an area median income (AMI) above 120%. This information was not surprising since direct marketing efforts from prior propensity research have focused on homeowners with those characteristics. Also of note, the data showed that homeowners with an AMI in the 60% - 100% range, moderate income customers, have participated in the program at a representative level to their statewide population. The Company will apply the findings from the study to target customers with a higher likelihood of participating in the weatherization component of EnergyWise.

EnergyWise Single Family Electric Participation Rate by Zip Code: 2009-15



Source: Navigant analysis of National Grid data

During the past two years, the program has increased marketing efforts to achieve annual targets. A combination of low fuel prices and a recovering economy has made saving energy costs less of a priority for homeowners. Consumers are engaging in home improvement projects, not necessarily energy efficient ones, with their discretionary income. Access to energy efficiency financing and generous incentives work to overcome this barrier.

ii. **Least Cost**

Since 2011, EnergyWise has helped customers address the initial “first cost” investment in energy efficiency by offering the 0% HEAT Loan which allows consumers the opportunity to spread the cost of efficiency upgrades over multiple years. The Company has also offered a lender of last resort, The Capital Good Fund, since 2013. The Capital Good Fund allows EnergyWise customers that may not have perfect credit, to receive financing from an organization that specializes in helping people fix their finances. In order to support more EnergyWise customers receiving Capital Loan Fund financing, the Company is interested in establishing a \$500,000 revolving loan opportunity for the Capital Loan Fund. This will support customers that may not receive financing through

traditional lender scoring. National Grid also anticipates promoting other efficiency financing opportunities that will benefit customers. The Rhode Island Infrastructure Bank anticipates introducing a residential offering in 2018. Furthermore, the Company will work with stakeholders and partners to explore new sources of capital and potential financial products and mechanisms such as on-bill repayment for residential customers.

Another program feature which will continue to support lower program costs is the aggressive installation of energy efficient lighting products. The rapid transformation of the residential lighting market for energy efficient lighting is a success story for the overall market and highlights the need for the *EnergyWise* program to install lighting products while there are still available lighting opportunities. 2018 will be one of the final years for robust savings in this area and the Company is optimistic that all actionable sockets will be addressed during home energy assessments.

iii. Environment

One of the target areas for Rhode Island's Green House Gas (GHG) emission reductions sectors is residential heating. *EnergyWise* supports GHG emissions reductions by tightening and insulating the home building envelope thereby reducing air leaks and conductive losses so less heating is required during the winter and less cooling is needed during the summer. The more customers that take advantage of weatherization services, the greater the reduction in GHG emissions. In 2018, National Grid will be increasing the weatherization incentive to delivered fuel customers to spur weatherization among this customer segment and support Rhode Island state goals.

iv. Future

National Grid is very aware that savings from energy efficient lighting will contribute less to overall residential savings in the coming years. In preparation for this reduction in kWh savings, *EnergyWise* has tested new products and processes that may increase savings. Most recently, the program incorporated air sealing benefits from recessed lighting trim kits. In 2016, the program piloted mechanical ventilation installations to assess the feasibility of streamlining installations and reducing overall costs. The findings from the work showed that the traditional pathway for mechanical ventilation was to upgrade bathroom fans which led to many different configurations. Further investigation into this process will be given to see if hallway ventilation can allow for a uniform installation process and bulk purchase of mechanical ventilation. In 2017 the program installed a limited number of home energy monitoring devices within vendor homes to assess the requirements needed for home setup. The Company has also

begun the process to pilot the Department of Energy's Home Energy Score with 150 customers which will continue into 2018. Also in 2018, EnergyWise will coordinate with the HVAC program to identify customers that could benefit from the installation of cold climate heat pumps for heating.

To reach savings goals EnergyWise will be promoting Wi-Fi thermostats for energy savings as well as the opportunity to partner with National Grid's Connected Solutions demand response demonstration (see section 16 a below).

6. Multifamily (Electric and Gas)

a. Overview

The Rhode Island Market Rate and Income Eligible Multifamily programs are poised for an exciting year in 2018. In early 2017, the Company undertook a deep review of the current program design and process before going through an extensive Request for Proposals (RFP) process for lead vendor services. As a result, new ideas, technologies and approaches were identified and will be implemented in 2018. It remains the Company's goal to offer a comprehensive program that is both cost effective yet thorough in treating this diverse segment of the population. The Rhode Island Multifamily program has a single lead vendor that utilizes a network of Rhode Island sub-contractors to serve all customers, including income eligible.

Eligible Multifamily program participants are defined as the following:²

- Buildings with 5 or more units
- Properties consisting of four or more 1-4 unit buildings that meet both of the following requirements:
 - Are connected or neighboring to each other, or to a 5+ unit building, and
 - Are owned by the same individual or firm.³

Both market-rate and income-eligible/affordable multifamily properties are subject to the above-outlined multifamily eligibility requirements for coordinated services. For the

² Stand-alone 1-4 unit buildings that do not meet these requirements are considered "single-family" and are served traditionally through *EnergyWise* Single Family or Income Eligible Services Single Family programs, as appropriate.

³ Should it be cost effective to do so, and provide a better customer experience, the vendor and Company, at their discretion may choose to serve buildings that fall outside of this definition. For example, four three-unit buildings (i.e. triple-deckers) not adjacent to each other but in close geographic proximity and under the same ownership may be served through the Multifamily program.

income-eligible properties, co-payments for energy efficiency services and measures may be waived.

The income-eligible multifamily sector is defined by properties that meet one of the following criteria:

- Owned by public housing authorities or community development corporations
- Receive affordable housing tax credits or any type of low-income funds/subsidies from the state or federal government
- Consist of building units where a majority of customers qualify as income-eligible customers (receive utility service on the A-60 Low-Income rate and/or have a household income of less than 60% of the Area Median Income)

Furthermore, a multifamily property may be eligible for services and incentives under both residential and commercial programs. As an example, a building with 20 units that is electrically sub-metered (20 residential accounts) with a commercial electric account for common areas and one commercial gas account serving a central heating/hot water system will likely qualify for incentives through Multifamily and the Commercial & Industrial Multifamily programs. While this adds a layer of complexity for the Company, it is critical that the Company maintain accounting via these various program budgets in order to ensure equity for all customers funding energy efficiency through the energy efficiency program charge. In contrast, the customer will not need to deal with this added layer of complexity, and will instead receive a consolidated incentive for all efficiency work completed at the site⁴.

b. 2018 Goals

The Company remains committed to aggressively seeking avenues for continued energy savings, including maximizing lighting upgrades in as many multifamily units as possible. As such, the Company is proposing the following goals which represent an increase over those filed in the 2017 Annual Plan.

⁴ For the past three years National Grid has offered a Multifamily Coordinator for RI customers looking to participate in the multifamily program to reduce any confusion and ensure a smooth enrollment process.

Electric Program	Demand Reduction (Annual kW)	Energy Savings (Annual MWh)	Customer Participation
Income Eligible Multifamily	170	3,287	4,800
Market Rate Multifamily	329	4,207	6,000

Gas Program	Gas Savings (Annual MMBtu)	Customer Participation
Income Eligible Multifamily	16,222	3,500
Market Rate Multifamily	12,069	2,500
C&I Multifamily	6,643	1,698

In addition to achieving megawatt hour and therm reductions, the Company aims in 2018 to do so by creating greater customer benefits, contributing to a healthier environment and taking steps to a clean energy future. To achieve these goals the Company is extending some enhancements that were identified in the prior year, as well as suggesting some new ideas for implementation.

c. How Goals Are Achieved

i. Continued 2017 Enhancements

In 2017, the Company put forth multiple program enhancements that it will continue through 2018 and beyond. Offering heating systems in the income eligible multifamily program provided great pipeline and opportunity through 2017 with over 50 central boilers installed. As such, the Company will continue to offer these replacements⁵ and consider in-unit heat pump applications where cost effective. Further, the Boiler Monitoring & Optimization effort of 2017 is showing favorable, though preliminary, results. The Company will continue learning from this technology in 2018 and consider including it as a standard program offering.

⁵ Due to the higher cost and limited quantities, heating systems in the income eligible multifamily program will be offered on a first-come, first-served basis and at the discretion of the Company.

Finally, in 2018 the Company remains committed to treating a number of facilities served by delivered fuels through both the market rate and income eligible electric programs.

ii. Heat Pumps and Smart Technologies

As proposed in the 2018-2020 Three-Year Plan, the Company intends to focus on introducing more innovations to secure untapped energy savings. In the multifamily sector specifically, this will include offering more smart thermostats and introducing the installation of ductless mini-split heat pumps in electrically-heated facilities and possibly facilities served by delivered fuels if cost effective. Especially relevant in the case of heat pumps, customers will benefit from training on how to use these products to ensure a reduction and not an increase in energy usage. The company will evaluate a number of buildings, scenarios, and customers where mini-splits have been installed and compare those who have received a level of training and controls to those who did not. Understanding how customers in multifamily facilities interact with this technology will help the Company better understand how to expand this offering in the future.

iii. Customer-Centric Recruitment Process

Giving customers the opportunity to participate is the first and most important step on the road to energy savings. By offering customized online invitations and sign-up processes that are site-specific, customers will be able to take part in the program in a more convenient manner than ever before. Increasing condominium unit-level participation and offering opportunities for renters remain areas of interest for the Company. By allowing an off-site condo owner who may only live in a property seasonally to electronically sign up for an audit, select measures, and authorize installations, the Company plans to address this recognized barrier.

iv. Building Benchmarking Data

For the past three years the Company has supported the benchmarking of income eligible multifamily facilities, resulting in over 500 buildings going through the program. Beginning in 2018, the Company will be offering automated uploads of aggregate energy usage to the US Environmental Protection Agency's Portfolio Manager. This will benefit multifamily building owners and operators of both income eligible and market rate properties by allowing them to track energy use across their portfolio of buildings.

v. Continued Focus on Finance Opportunities

With new, often more expensive technologies entering the marketplace (e.g. mini-split systems), financing opportunities may allow more customers to participate and achieve deeper savings. As such, the Company is increasing the amount of funds dedicated to the Multifamily Heat Loan for condo owners in 2018. Furthermore, the Company will work with stakeholders and partners such as the Rhode Island Infrastructure Bank (RIIB) and RI Housing to explore new sources of capital and potential financial products and mechanisms such as on-bill repayment for residential customers.

7. Income Eligible Services (Electric and Gas)

a. Overview

National Grid's single family Income Eligible Services (IES) Program provides comprehensive, fuel neutral (electric, gas, oil and propane), no-cost services to educate customers about energy efficiency, and helps them to reduce their electric and heating bills and improve the thermal comfort of their home. Income Eligible Services are available for customers who live in 1-4 unit residences and qualify for the Low Income Heating Assistance Program (LIHEAP)⁶, also known as "fuel assistance," or who qualify for the National Grid discount utility rates (A-60 and or 1301 rates).⁷

Services Provided – IES Program and WAP/LIHEAP

Income Eligible Services (IES) Program*	Federally-funded Weatherization Assistance Program (WAP)*
<ul style="list-style-type: none">• Conduct whole house Energy Assessment and provide customer education<ul style="list-style-type: none">○ Review utility bills	<ul style="list-style-type: none">• Conduct whole house audit/ energy efficiency evaluation (not

⁶ The federal government has set an income level, tied to the median income of each state, which defines the uppermost income boundary for LIHEAP participation. Individual states have some flexibility in defining income eligibility as long as it is not set above the federally defined maximum. Eligibility in this program will track the eligibility for LIHEAP set by the State of Rhode Island.

⁷ These eligibility requirements are subject to change as a result of any regulatory directives, or as deemed necessary by the Company to enhance participation and/or savings.

<ul style="list-style-type: none"> ○ Assess whole house energy efficiency from attic to the basement. ○ Replace incandescent and halogen light bulbs with LED light bulbs ○ Install smart power-strips ○ Install water efficient showerheads ○ Discuss opportunities to save energy and money through weatherization and upgrading eligible heating, cooling and hot water systems and appliance ● Install weatherization measures <ul style="list-style-type: none"> ○ Insulation, air sealing and duct sealing if needed ● Replace eligible heating, cooling and hot water systems and appliances if they are deemed inefficient or unsafe 	<p>appliances)</p> <ul style="list-style-type: none"> ● Install weatherization measures (insulation, air sealing, duct sealing) ● Replace inefficient heating equipment if deemed inefficient or unsafe ● Improve minor health and safety issues in the home.
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*Both the IES and the WAP offer all services and products at no-cost to the customer.

IES is administered through a Lead Vendor that manages the day-to-day operations of the Program. The Lead Vendor maintains consistency and quality assurance of the services among the CAPs by providing ongoing technical and best practices training for the CAPs' energy efficiency auditors and home performance professionals. The Vendor also performs field verifications and testing to verify consistency and quality of completed work.

The Lead Vendor works directly with the six Rhode Island territorial-based Community Action Program agencies (CAPs) to deliver IES. The CAPs manage the customer intake and application processes for IES. National Grid provides the CAPs with marketing collateral, videos, and tools to increase awareness of – and comfort level for – IES Program.

The Income Eligible Services program works in close collaboration with the State of Rhode Island Department of Human Services Weatherization Assistance Program (WAP), overseen by the federal Department of Energy, and the Low Income Home Energy Assistance Program (LIHEAP), overseen by the federal Department of Human Services. IES leverages its ratepayer-funds and the federally-funded Weatherization Assistance

Program (WAP) and Low Income Home Energy Assistance Program (LIHEAP). This collaboration ensures that customers receive the greatest possible benefits to reduce their energy use and costs.

b. 2018 Goals

The overall goal of the Income Eligible program is to provide comprehensive energy efficiency services that help to reduce energy costs and improve a home's thermal comfort. In addition the program seeks to increase its participation goals through targeted marketing, collaboration and by leveraging National Grid's efforts to offer the discount rate to new eligible customers.

2018 Income Eligible Services Single Family Electric and Gas Goals

Electric

Demand Reduction (Annual kW)	Energy Savings (Annual MWh)	Customer Participation
696	4,185	2,750

Gas

Energy Savings (Annual MMBtu)	Customer Participation
12,620	675

c. How Goals Are Achieved

In order to achieve these goals the Company will utilize several strategies and tactics.

i. Technical Training and Financial Incentives

- Conduct trainings and best practices meetings for CAP auditors and program inspectors throughout the year:
 - Weatherization Technical Committee meetings to define and ensure consistent measure installation across the state.
 - ASHRAE trainings – best practices for ventilation systems
- Provide updates as necessary to the WAP/IES Operations Manual and conduct training addressing all updates.

- Partner with the RI Department of Human Services to conduct and or host trainings as well as update program implementation materials.
- Participate in relevant training sponsored by third-party organizations including:
 - RI Department Human Services (DHS)
 - DOE Weatherization Assistance Program
 - Industry experts
- Provide whole-house no-cost energy efficiency solutions to income eligible customers.

ii. Streamlining the Customer Experience

- Participate in Community Expos to help customers understand how to reduce their energy bills and manage their energy expenses.
- Make available to CAPs the use of the Energy Innovation Hub to provide education and training to their respective communities.
- Ensure that customers who are newly added to the income eligible rate (A-60) are connected directly to income eligible services (IES) for energy efficiency.

iii. Collaboration

- Conduct quarterly budget and performance meetings with each agency to assess progress toward budget and goals and provide CAPs with clear direction on opportunities.
- Collaborate with other programs and/or organizations to implement the IES program and assess improvements in 2018. Key organizations that IES will engage include:
 - Community Action Programs
 - Rhode Island Housing
 - Office of Energy Resources and Division of Public Utilities and Carriers
 - The State's Zero Energy Buildings initiative
 - The State's Community Solar initiatives
- Continue to work closely with Rhode Island Department of Human Services (DHS) Management team to coordinate the integration of budgets – National Grid's energy efficiency funds and funding from Federal DOE and LIHEAP programs – to maximize leveraged funds, match funding to capacity, and

build a reliable funding stream for the Community Action Program (CAP) agencies.

iv. New Efforts and Strategies Incorporated in 2018

- Add new measures to the program offerings:
 - Dehumidifiers
- Explore the possibility of adding new measures to the program offerings. Considerations include cost effectiveness and customer acceptance.
 - Wi-Fi thermostats
 - Smart-home and energy monitoring technologies to allow customers to see and manage energy use (behavior)
 - Heat pump mini-splits
 - Clothes Washers
- Explore the possibility of developing a mobile home replacement program with zero energy models like <http://vermodhomes.com/>.
- Use segmented marketing strategies to help income eligible customers learn about programs that will specifically benefit them. For example, the ability to notify customers of upgrades that would be relevant to their specific situation (e.g. promoting heat pumps to customers heating with oil heat and inefficient electric resistance heat).
- Collaborate with Rhode Island Housing and Office of Energy Resources to develop a moderate income/income eligible zero energy home(s) as part of its focus on developing a zero energy model. This demonstration will provide important information to guide the development of a zero energy offering in 2018 or 2019.
- Develop a protocol for serving customers in triple decker buildings.

v. Workforce Development

Collaborate with RI DHS to leverage job development. Agencies will hire staff to be trained in AMP audits. AMP audits are relatively quick to learn, and no stipend (other than available AMP opportunities and training) will be provided. This will determine the character and quality of the employee. Are they empathetic with the customer; are they punctual; do they follow program protocols? This will be a 6-month process. Successful candidates will then receive OSHA & BPI training, sponsored by DHS. The candidate will then work for the agency as a Junior Auditor for 3-6 months based on

performance. Successful candidates will then be promoted to Auditor and receive additional training.

8. Residential New Construction (Electric and Gas)

a. Overview

The Residential New Construction and Renovation/Rehabilitation (RNC) program is a fuel neutral program (like the other whole house programs) that provides comprehensive energy savings opportunities for single-family and multi-family projects for both the market rate and income eligible⁸ markets. The program offers a combination of no-cost services and incentives to assist in the design and development of high-efficiency homes. In 2017, the Program set a goal of 550 projects with approximately 50% planned for new construction projects and 50% for renovation/rehabilitation projects.

The RNC program's baseline for efficiency is derived from the average energy performance of a home built in RI, referred to as the User Defined Reference Home (UDRH). The RNC program has a tiered energy-efficiency incentive structure that compares a home's energy performance against the UDRH. In 2017, the RI UDRH was updated based on current industry practice, which resulted in a substantial increase in the efficiency level of this baseline. The new 2017 UDRH will present a challenge for developers and builders to achieve incremental improvements above the RNC program baseline. Since the UDRH results demonstrate market transformation, they will also provide the basis for a comprehensive review of the existing RNC program structure and will inform how the program incentives will be offered in the future. As with any market transformation, the future holds promise for the development of new programs. To gain insight and collaboration, the Company will collaborate with, and possibly convene, other regional stakeholders to discuss the future of RNC programs and the prospect of – and best practices for – zero energy home programs.

⁸ Customers who qualify for LIHEAP assistance or who qualify for the National Grid discount utility rates.

The 2018 tiered incentive structure will be as follows:

Tier Level	2017 % More Energy Efficient Than 2011 Baseline*	2018 % More Energy Efficient Than 2017 Baseline**
Tier I	15% - 30%	15% - 30%
Tier II	31% - 44%	31% - 44%
Tier III	45% or more	45% or more

*Based on the 2011 User Defined Reference Home

**Based on the 2017 User Defined Reference Home

The RNC program offers the following resources to assist builders, developers, and owners design and build energy-efficient homes with lower operating costs and increased durability, comfort and safety:

- a. Code compliance and technical trainings
- b. Energy modeling and design assistance
- c. In-field inspections
- d. HERS Rating
- e. Optional ENERGY STAR® Homes verification for projects seeking the EPA label
- f. Complimentary ENERGY STAR bulbs and WaterSense® showerheads
- g. Financial incentives based on the level of energy efficient structure and equipment.

The RNC program works closely with many RI builders and developers to help them advance their building practices, construct high-efficiency homes, and earn the available incentives. Through the combination of RNC education and training, program incentives, and code testing enforcement, builders are improving the quality of projects and are an excellent example of market transformation.

As Rhode Island adopts progressively more efficient building energy codes (notwithstanding the current delayed code update), reaching the energy savings needed to warrant efficiency incentives becomes more difficult (assuming level compliance).. Therefore, the Company is considering a re-design of the RNC program over the next three years to optimize the available savings and will push toward a zero energy home

that will also support the Zero Energy Task Force Recommendations and the Power Sector Transformation efforts.

See the Commercial & Industrial plan filing for additional detail regarding the Company's Energy Codes and Appliance Standards support initiative.

Multifamily: There has been a recent increase in the new construction and major rehabilitation of large multifamily projects in Rhode Island, both in the market rate and affordable housing sector. While some of these projects fall clearly under residential programs and others commercial, there are many occasions where projects intersect, and design and construction teams interact with both programs for services and incentives. Examples include: mixed-use buildings; mid to high rise residential buildings; housing developments with extensive common areas, parking lots and garage lighting; and master-metered residential projects. To provide comprehensive, seamless service and capture all savings on behalf of both the RNC and the C&I New Construction programs, the RNC program lead vendor works, in close collaboration with the C&I program lead vendor to develop a custom program specifically designed for these types of projects.

Zero Energy Homes: In 2017 the Company partnered with Rhode Island Housing and Office of Energy Resources (OER) to issue an RFP to design and construct a Zero Energy Building (ZEB) housing unit(s) to serve low- and moderate-income residents in Rhode Island. The project will be required to employ solar PV and air-source or ground source heat pump technologies to achieve ZEB status. The Company will remain involved in the program for three years, with an option to extend another two years, to conduct monitoring of the anticipated zero energy performance. In 2018, the Company will partner with OER to issue an RFP for a similar demonstration project, but targeted at the market-rate community. The alignment with OER will provide a connection to the State's Zero-Energy Building initiatives. The 2018 demonstration project will be required to be an all-electric project and employ smart technologies as well as energy management systems. The Rhode Island Stretch Code (see below) will be incorporated into the RFP. For more information see section 16e.

In 2018, the Company will use the demonstration projects mentioned above along with engagement of local and regional stakeholders (i.e., energy, construction, solar contractors, real estate, appraisers) to develop a new offering of a new zero-energy, or zero-energy ready (without PV) new construction home. As outlined in the ["Zero Energy](#)

[Building Pathway to 2035, Whitepaper Report of the Rhode Island](#), zero energy homes and buildings will be a significant contribution to the state reaching its greenhouse gas goals set forth in [“Energy 2035: Rhode Island State Energy Plan”](#). Components that could be considered in a new offering could include: all electric home, PV, WI-FI enabled thermostats, battery storage, connected to [demand response programs](#), and electric vehicle charging station.

The RNC program will also incorporate the new Rhode Island residential stretch code, which is based on U.S. DOE’s Zero Energy Ready Home program and is scheduled to be completed by the end of 2017. This stretch code will not be a local option for mandatory compliance as in Massachusetts but instead will serve as a voluntary pathway to additional efficiency beyond code. It is envisioned that the stretch code will evolve as the State updates its energy code to serve as a bridge to mainstreaming zero energy construction practices across Rhode Island. As the Zero Energy Home demonstrations and the new RNC programs evolve, they will include the RI Stretch Code in the design development. *See the Commercial & Industrial plan filing for additional detail regarding the Company’s Energy Codes and Appliance Standards support initiative.*

b. 2018 Goals

The overall goal of the Residential New Construction program is to incorporate energy efficiency design features into the building of new homes. Having these design features incorporated during the construction process is more cost effective than retrofitting homes at a later date.

2018 Residential New Construction Electric and Gas Goals

Electric

Demand Reduction (Annual kW)	Energy Savings (Annual MWh)	Customer Participation
49	619	501

Gas

Energy Savings (Annual MMBtu)	Customer Participation
3,117	255

c. How Goals Are Achieved

Program elements for the Program in 2017 include:

i. Technical Training and Financial Incentives

- Partner with the RI Code Compliance Enhancement Initiative (CCEI) to conduct hands-on infield training for builders, tradespeople, code officials, and students. These trainings provide a unique opportunity for participants to view projects during the construction phase to learn about both energy code requirements and best building practices.
- Comprehensive no-cost technical services to educate project teams how to design and build a high-efficiency home.
- Tiered incentives based on the efficiency of the building envelope.
- Incentives for eligible high-efficiency heating and cooling systems. These incentives are consistent with the HVAC program incentives, but offered as a package with the HVAC envelope incentive to ensure availability of incentive funding.
- Competition – the Zero Energy Home Challenge will be offered again in 2018. The Challenge awards a zero energy home, or net-zero energy home that is designed and built by a Rhode Island Based project team. The award is a cash award and will be presented at the 2018 Home Show.

ii. Collaboration

- Collaborate with other programs and/or organizations to implement the RNC program and assess improvements for re-designing the program in 2018. Key organizations that RNC will engage include:
 - Rhode Island Builders Association.
 - Rhode Island Housing.
 - Renewable Energy Growth and Renewable Energy Fund distributed generation initiatives.
 - Green Building Advisory Committee & RI Building Code Commission
- Participate in local and regional events to promote energy efficiency and the RNC program.

iii. New Efforts and Strategies Incorporated in 2018

- In 2018, the Company will adopt a new User Defined Reference Home (UDRH) baseline that will reflect the current energy efficiency of new construction single-family homes in Rhode Island.
- Based on both the new UDRH and Participation Study, the Company plans to develop a re-design of the RNC program in 2018. The program may include packages of offerings in order to maximize savings, smart home technologies to engage the customer in their energy management and/or move to a zero energy home model.
- National Grid will support the expansion of the local HERS Rater community by training, certifying, and mentoring Rhode Island based individuals and companies to perform HERS ratings for projects enrolled in the RNC program. This will create a larger local network of trained energy efficiency professionals, promote workforce training and development, and facilitate the successful transition to a fully open-rater program model in which Rhode Islanders can compete effectively with experienced HERS Raters from surrounding states.
- The Company will support efforts to encourage the sharing of HERS scores and other building energy metrics at the time of real estate transactions.

iv. Codes and Standards

A new residential baseline study completed in 2017 replaces the 2011 Baseline Study of Single-family Residential New Construction and serves as the basis for the Rhode Island User Defined Reference Home. The 2017 Study shows that, while increasing compliance rates have reduced the remaining savings from energy code support, some homes are still built to levels below the state's building energy code. Since there remains an opportunity to elevate all projects to increased code compliance, the RNC program continues to support code trainings to educate contractors. Additional energy code savings potential would become available in the event that the state updates its energy code. Considerable opportunities to streamline HERS Rating support across both the RNC and Codes and Standards are available in anticipation of such an update. See the Large Commercial and Industrial New Construction Program for details for the Codes and Standards training program.

*Code Savings is included in the 2018 Goals for Residential New Construction listed in section 8b.

Electric: Energy Savings (Annual MWh)	Gas: Energy Savings (Annual MMBtu)
157	898

9. Behavior and Products Programs

Behavior and Products Programs serve customers in a different way and at a different point-in-time than Whole Home Solutions. With the Whole Home Solutions, a customer may not be familiar with all aspects of energy efficiency but can rest assured they are learning more about their home from trusted energy professionals. Products Programs generally work with the customer during the point-of-purchase either in a retail environment or by energy professionals assessing heating and water heating systems whereas Behavior programs target and influence “how” a customer interacts with those products.

For example, a customer may replace a household energy item upon failure and may not have spent much time researching varying options since the last time a similar product was purchased. Replacing simple light bulbs twenty-years ago required considering size and overall wattage. With today’s lighting purchase, a customer could consider how bright they would like the light to be (lumens per watt), the wattage, type of color, and the number of lifetime hours. Moreover, while switching to an efficient product is a great step, customers who leave lights running all day, or wash clothes on the hottest setting, are not fully realizing the benefits of living an efficient lifestyle.

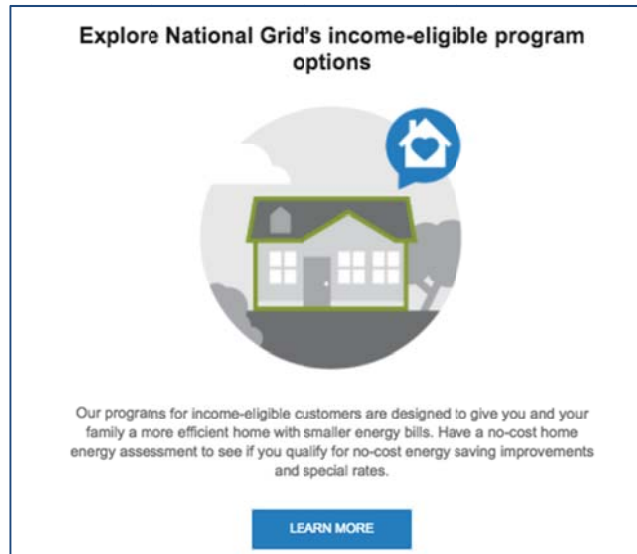
The above example highlights the need to educate consumers about efficient products prior to the purchase period and the need to continue working with customers on how they interact with these products through the years. The education process can be a complicated endeavor since the challenge is to engage customers when they are not in the market for a new item, when a bad usage habit has already formed, and National Grid’s messaging is competing against other life demands. In 2018, to reach a wider range of customers, the Company will consider how it could present efficiency solutions alongside renewable energy measures a customer may be considering.

10. Home Energy Reports (Electric and Gas)

a. Overview

The Home Energy Reports (HER) program is the Company's key program to achieve energy savings through changes in customer behavior. This is achieved by presenting personalized energy usage data and encouraging desired behaviors to reduce energy consumption. Globally, over 15 million homes receive HERs from more than 100 utilities serviced by the Company's vendor. Since its launch in Rhode Island in April 2013, the HER

program has helped the Company to achieve portfolio-wide savings goals while also maintaining cost efficiency. In 2016 alone, the program generated over \$6.7 million in customer bill savings.



The HER program is a statewide energy efficiency program that provides benefits for all Rhode Island residential customers. While over 300,000 customers receive HERs (i.e., the treatment group) by way of direct mail and/or e-mail, all account holders have access to insight into their energy consumption via the web tools located on the National Grid website. The program has evolved since 2013 from offering only mailed insights to now being integrated into the Company's website with online assessment tools, sending Non-Advanced Metering Infrastructure (AMI) High Usage Alerts, and utilizing segmentation to target different populations with relevant messaging.

Program savings are derived from sending hardcopy or electronic HERs (eHER) with personalized energy insights, normative messages, efficiency tips and recommendations, and promotional messages for efficiency programs in the Company's wider portfolio. The program measures energy savings by comparing on-bill energy usage between a treatment group (customers who receive the HER) and control group (customers who do not receive the HER), using both pre and post-treatment data (i.e. A Randomized Control Trial or RCT).

Since the country's first HER programs began in 2008, there have been numerous evaluations that validate the savings generated from these behavioral programs. Furthermore, while customers may move forward with taking an action such as changing their lighting to LED or purchasing a new piece of energy efficient equipment, the simple act of receiving the report alone may create habitual energy saving behaviors that account for the majority of savings attributed to the program⁹. The frequency or persistence of these habitual actions, such as turning off lights or adjusting the thermostat, is directly correlated to the cadence and even medium (i.e. print or digital version) of the reports.

The program is administered by a Lead Vendor that developed and launched the first HERs in the country. Since 2013, the Company has employed the Lead Vendor to implement the HERs in all three of its jurisdictions (Massachusetts, New York, and Rhode Island). The Lead Vendor is responsible for maintaining HER distribution groups, tracking data, managing the Web Portal, and documenting energy savings. The Lead Vendor works with the Company to craft the messaging and delivery of the HERs, and also works with the Company to introduce additional program enhancements, aligning with the Company's state-wide comprehensive marketing efforts.

b. 2018 Goals

In 2017, the program underwent an updated impact evaluation that resulted in adjustments to the realization rates the program was operating under. These new realization rates are applied to the 2018 goals resulting in greater gas savings but a slight reduction in electric savings.

Program	Demand Reduction (Annual kW)	Savings (Annual MWh or MMBtu)	Customer Participation
Home Energy Reports Electric	3,325	25,054	213,750
Home Energy Reports Gas	N/A	77,220	104,250

⁹ Khawaja, M. Sami and J. Stewart 2014. "Long-Run Savings and Cost-Effectiveness of Home Energy Reports Programs" Cadmus Group Inc. Winter 2014/15

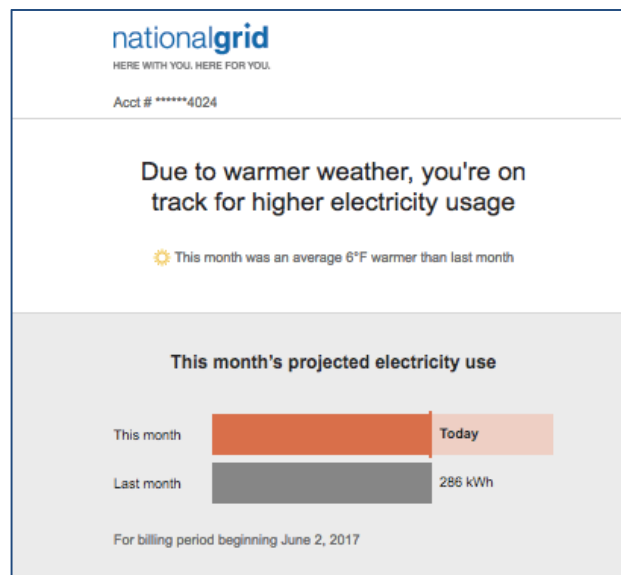
c. How Goals Are Achieved

i. Seasonal Efficiency Modules

Rather than providing a static experience for customers, the Company will continue to include messaging in the digital and print versions of the HERs that align with the seasons. For example, this could take the form of a “Prep for Winter” module sent to gas customers with the goal of reminding them to be aware of their thermostat settings as winter approaches. In the case of inclement winter weather, the Company could offer an “Ice Dam Prevention” module and drive customers to have their *EnergyWise* Home Energy Assessment. These seasonal campaigns have shown a clear boost to savings rates.

ii. Customer Notifications and Segmentation

In June of 2017, the Company began emailing Non-Advanced Metering Infrastructure (AMI) High Use Alerts to customers who were trending to exceed the prior month’s usage by 30% due to seasonal change. Weather-based forecast algorithms are able to predict customers’ bills without AMI Data. These insights are delivered via email on an opt-in or opt-out basis, and are designed to help residential customers become aware of their trend toward higher energy usage and giving them the option to modify their



behavior, thus saving energy and money. This is similar to phone plans that alert customers when they are trending to exceed their allotted data. Giving customers this information can help plan for what would have been an unexpected high-bill.

Further, in fall of 2017, the Company began offering a different email alert to those customers on income eligible rates directing them to RI assistance programs such as no-cost home energy assessments, information on health and safety, budget billing options, and other payment assistance opportunities. This approach to segmentation has also been applied to the standard print HER and eHER and will continue through 2018.

11. ENERGY STAR® Lighting (Electric)

a. Overview

National Grid has offered residential lighting incentives since the mid 1990's and the savings from this program has consistently contributed to the overall residential portfolio. During the intervening decades, lighting technologies have changed for the better and combined with supporting legislation (Energy Independence and Security Act), a nearly, full market transformation of residential lighting is anticipated by the end of this decade. An energy efficient light bulb has become so synonymous with energy efficiency that it is frequently used to represent the "green" concept and National and Regional campaigns have revolved around challenging consumers to take the first step with installing an energy efficient lamp. Another nice aspect of lighting leading the efficiency charge was the low purchase cost and simplicity of installation and operation.

National Grid has been a leader in lighting market transformation through the early application of upstream and midstream lighting incentives thereby influencing more lighting products at retail shelves and encouraging retailers to stock more ENERGY STAR lighting products. This continuous program influence still impacts the overall marketplace today when compared to program states that have discontinued direct lighting support. Recent shelf surveys show that states with continuous programs have a larger percentage of ENERGY STAR lighting products than states without program support. Another key strategy that has made the lighting program successful and created consumer engagement is quick, online flash sales. Customer response over the past several years to these short-term offerings has been robust. Finally, the use of a pop-up retailer that communicates the benefits of efficient lighting while selling the product at non-traditional retail locations supports education as well as energy savings.

b. 2018 Goals

Demand Reduction (Annual kW)	Energy Savings (Annual MWh)	Customer Participation
4,413	38,891	292,150

c. How Goals Are Achieved

In 2018, the ENERGY STAR Lighting program will contribute almost 50% of the non-income eligible annual electric energy savings and almost 60% of lifetime savings. These robust targets will require that the program still target all consumers and sockets that

currently do not use or have efficient lighting installed. A majority of the promotion will occur through mass market channels with information shown at the point-of-sale. There will be additional emphasis on providing incentives to hard-to-reach communities where traditional retail channels may not have as large of a presence as discount retailers. Discount retailers, locally owned mini-marts, and continued placement at food banks will all be strategic partners in expanding the reach of ENERGY STAR Lighting program.

Lighting is still a well-recognized cornerstone of efficiency and with the success of online, social media based flash sales, the program has cross promoted items that are not as well-known, such as hot water saving shower products and advanced power strips. One large benefit of the rapid lighting transformation has been a corresponding drop in the cost of light emitting diode (LED) lighting. This allows the program to reduce the incentives paid on lighting products. The program will also be following the results of the Emerging Lighting Control demonstration to see if there are savings to be realized with smart, controllable lighting combined with behavior messaging.

The Lead Vendor of the program, which is also the Lead Vendor of the Residential Consumer Products program, has introduced online training modules for retailers' sales staff to provide up-to-date and easily accessible product information about both ENERGY STAR lighting products as well as Residential Consumer Products. This tool allows for retailers and their employees to engage in product specific training as their schedule allows. Online education is also supported with in-store visits that verify accurate signage, discuss customer interest in various product lines, and support customer education and outreach events.

12. Residential Consumer Products (Electric)

a. Overview

Residential Consumer Products incorporates both the federal Department of Energy and Environmental Protection Agency ENERGY STAR categories of consumer appliances and electronics as well as some energy savings items not included by the federal agencies. The largest savings element of the Consumer Products program comes from recycling older refrigerators, freezers, and dehumidifiers. By removing these energy inefficient products from use, consumers can reduce household energy bills. The program also supports a combination of upstream and midstream incentives as well as post purchase consumer incentives. The upstream and midstream incentives encourage retailers and manufacturers to support ENERGY STAR with production and availability of products.

Consumer incentives are designed to bring efficient products costs in line with less efficient equipment, thereby encouraging the adoption of the more efficient item.

In 2018, the program will support dehumidifiers, dehumidifier recycling, dryers, refrigerator and freezer recycling, room air cleaners, room air conditioners, advanced power strips, and efficient shower heads. Historically, the program has been most successful when there is continuity in product lines as well as incentive levels to reduce both retailer and consumer confusion. The rapidly evolving consumer marketplace has made continuous support challenging due to overall improvement of appliance and consumer electronics standards. National Grid will be looking for opportunities to incorporate new items as well as continuing to support consumer products that are cost effective.

b. 2018 Goals

Demand Reduction (Annual kW)	Energy Savings (Annual MWh)	Customer Participation
429	2,849	9,682

c. How Goals are Achieved

In 2018, the Residential Consumer Products program will investigate the support of ENERGY STAR's Retail Products Platform which is a collaborative midstream initiative that engages retailers nationwide in supporting energy efficient consumer products. This effort will allow the program to support additional appliances and electronics at a lower incentive level. The nationwide approach supports participating retailers with a dedicated scale and benefits program administrators with better tracking information. National Grid anticipates designing the program in the first half of 2018 and launching the initiative in the second half.

The Company will also continue special, limited time promotions to draw consumer interest in specific items at different periods of the year. An enhanced refrigerator and freezer recycling promotion and advanced power strip flash sale have been positively received.

13. High-Efficiency Heating, Cooling and Hot Water (Electric and Gas)

a. Overview

The High-Efficiency Heating, Cooling and Hot Water Program (HVAC Programs), for both gas and electric systems, promote the installation of high efficiency space heating and cooling equipment, water heating measures, and controls through the use of tiered customer rebates. The programs also provide contractor training and incentives for proper equipment sizing, quality installation verification and distribution system improvements.¹⁰

The programs are administered by one lead vendor that provides outreach and programmatic support to participating contractors and distributors to ensure they have the knowledge to effectively communicate the program offering to customers, and the technical expertise to offer quality installations. The Lead Vendor provides contractor meetings and trainings during the year, participates in relevant industry events and offers ongoing technical assistance to participating contractors.

While the Lead Vendor is the face of the Program, contractors continue to serve as the Program's primary delivery mechanism. The Lead Vendor works closely with the contractor community to provide trainings and outreach to ensure accurate and efficient delivery of Program services to customers, while also improving contractors' skills and capabilities. In 2018 contractor outreach events will continue to cover equipment specifications, right-sizing equipment, proper installation of outdoor reset controls, sealing and insulating equipment to achieve optimal performance, awareness of current code requirements, and the best ways to assist customers with rebate submissions. Particular focus will continue to be given to the technical requirements of condensing boilers to ensure that contractors accurately install the equipment to achieve the efficiency potential of the equipment. In 2018, the program will collaborate with NEEP and other stakeholders to develop and offer training to contractors on proper sizing and installation of heat pump systems.

¹⁰ Residential programs do not promote or fund fuel switching to natural gas. It is only after a customer decides to switch to natural gas that they are eligible for an energy efficiency rebate. At the time the customer switches from another fuel to natural gas, they become eligible for an energy efficiency incentive that covers part of the incremental cost of higher efficiency gas equipment.

Participation in the Program is attributed to two channels: contractors offering energy efficient products/incentives and customers' request for efficient equipment to reduce energy bills.

In 2017 the Company offered qualified electronically commutated motor (ECM) pumps in an upstream incentive model. The program proved to be effective in increasing the amount of ECM rebates issued in 2017. In 2018, the Company will build off the ECM success and offer heat pump water heaters in either an upstream (to the manufacturer) or midstream (distributors and contractors) delivery model. The outcome of this initial launch, along with review of other successful regional programs (i.e., Connecticut upstream models), will inform the process for delivering future HVAC equipment up/midstream. The potential shift in where the energy efficiency incentive is offered has been shown to increase sales which result in more savings based on quantity. Importantly, increased sales result in increased incentive costs, which could cause a dramatic shift in program budgets. Offering an up/midstream model simplifies residential customer or contractor participation because the high efficiency product is already discounted and the customer is not required to submit rebate forms or wait for rebate checks. The program design will include a mechanism to obtain customer information in order to provide future communication to the customer and also to inform future evaluations of the program. In light of all of these factors, the Company will continue to evaluate how the mid/upstream model for other equipment within its programs.

Cold Climate Heat Pumps:

In 2018, the Company added a modest number of ductless air-source heat pumps in an effort to begin the process of a long-term market transformation of displacing electric resistance or delivered fuels heating systems with high-efficiency cold climate electric heat pumps. Qualified cold climate heat pumps are an effective technology for providing space heat in the New England region as demonstrated in the NEEP Northeast/Mid-Atlantic Air-Source Heat Pump Market Strategies Report 2016 Update. In addition, providing space heat via high efficiency heat pumps is an important strategy for reducing greenhouse gas and other air emissions produced by fossil-fuel fired heating equipment. As this program develops and evolves, Rhode Island can also benefit from the best practices that are available from other states in New England including Vermont, Connecticut, and Maine.

The Company proposes developing a cold climate heat pump program offering in 2018. The program offers a small number of units in 2018 as the program development will take place in the beginning of the year. The proposed program offering would include customer education about the benefits of the technology, criteria for proper use and optimal operation of the units; contractor education about the product, sizing and installation requirements; strategic marketing to customers through program segmentation; research, and piloting of available enhancements (i.e., integrated controls that tie into both the heat pump and existing heating system, mid/up-stream markets, bundling of incentives); an incentive structure that both builds the market and ensures the heat pump is used as the primary heat source in the home; potential required contractor qualifications, methodology for QA/QC. Future incentive structures may include a bundling strategy to include heat pumps, weatherization and PV for a deeper saving and potentially a more compelling offering.

Based on the marginal cost effectiveness of heat pumps per the MA/RI Cadmus Ductless Mini-Split Heat Pump Evaluation (December 30, 2016), this program will start out offering a small quantity of qualified heat pumps in order to develop, test, and refine the program if installation or implementation issues arise. The program will need time in 2018 to develop proper training tools (based on NEEP design, selection, installation and operation best practices guides), incentives, program implementation processes and to properly identify eligible customers where this technology can be the most cost effective. The program will need to provide flexibility and methodology for reviewing the progress and allow for mid-year changes if needed. Also starting out small allows for consideration of a mid/up –stream offering in future years.

The Company will utilize relevant NEEP resources to qualify heat pumps installed in the program (i.e., NEEP “Cold-Climate ASHP Specification”) as well as for determining the proper sizing of equipment (i.e., NEEP “[Guide To Sizing & Selecting Air-Source Heat Pumps in Cold Climates](#)”) and installation best practices to provide sufficient heat output (i.e., NEEP “[Guide To Installing Air-Source Heat Pumps in Cold Climates](#)”).

In September 2017, the Rhode Island Public Utilities Commission held a technical session on the strategic electrification programs proposed for both the residential and commercial and industrial sectors. The Company will continue to collaborate with the experts at the session – the Rhode Island Office of Energy Resources, and consultant team representing the Energy Efficiency Resources Management Council (EERMC) – as well as with others that were referenced as the industry leaders including NEEP and

People's Power & Light. Where appropriate, the Company will also support market transformation activities through complementary channels, for example rate case filings. Working in a collaborative manner will help to ensure that the process for offering heat pump mini-splits will advance market transformation of the heat pump technology.

The HVAC program will work closely with the Demand Response /ConnectedSolutions program to ensure synergy between the two programs. The ConnectedSolutions program offers an incentive program for customers when they enroll in their Wi-Fi thermostat(s) and other connected devices to reduce electric use during periods of high energy demand.

b. 2018 Goals

The overall goal of the HVAC programs is to provide a range of high efficiency space heating and cooling equipment, water heating measures, and controls that encourage a customer to make the choice to purchase the energy-efficient equipment.

Electric

Demand Reduction (Annual kW)	Energy Savings (Annual MWh)	Customer Participation
433	2,091	1,794

Gas

Energy Savings (Annual MMBtu)	Customer Participation
27,513	1,557

c. How Goals Are Achieved

In order to achieve these goals the Company will utilize several strategies and tactics.

i. Technical Training and Financial Incentives

- Provide regular trade ally engagement events at local supply houses throughout the year to provide updates and training opportunities. Trainings will focus on pertinent topics including seasonal preparations, best practices for installation of

condensing boilers, demand response, identifying opportunities for cold climate heat pumps, etc.

- Educate customers and contractors on cost savings and comfort associated with using cold climate heat pump systems for heating. This effort will focus on proper operation and maintenance of systems after they are installed. Customer-focused materials will be developed by the Program and distributed by contractors to their customers. The Lead Vendor will train contractors on the best techniques for efficient operation so that they can provide consistent guidance to their customers.

ii. Streamlining the Customer Experience

- Marketing strategies will make broader use of segmentation to ensure customers are fully aware of HVAC programs that would be relevant to their specific situation; such as promoting heat pumps to customers heating with electric resistance systems and oil heat.

iii. Collaboration

- Collaborate with other programs and/or organizations to cross-promote the HVAC program:
 - EnergyWise Home Energy Assessments to provide a path for customers to reduce energy load and subsequently right-size heating, cooling and hot water equipment. EnergyWise assessments can also gather detail on homes that current use electric resistance for water heating and/or space heating.
 - Community Engagement Program
 - Add high-efficiency heating, cooling and hot water systems as one of the metrics
 - ConnectedSolutions demonstration program. Support all demand response enabled electric HVAC and DHW equipment.
 - Wireless thermostats
 - Heat pump water heaters
 - New products as they become available.
 - DemandLink™ pilot in Tiverton and Little Compton (SRP Report Docket No. 4655)
 - Rhode Island's Zero Energy Buildings initiative
 - Gas Conversion (Gas Sales)

- promote high efficiency heating systems during the conversion process
- Collaborate with fuel dealers to provide education on energy efficiency programs

iv. New Efforts and Strategies Incorporated in 2018

- Increasing incentives:
 - Wireless Thermostats
 - Boiler 95% AFUE (annual fuel utilization efficiency)
 - Combo condensing boiler units
 - Furnace 97% AFUE
 - On-demand water heater 94%
- Adding the Combo Furnace into the gas program offering
- Developing an up/midstream incentive offering for qualified heat pump water heaters.
- Explore mid-stream model for cold climate heat pumps in 2018 for possible roll out in 2019 or 2020.
- Adding electric ductless cold climate heat pumps for heating measure (oil fuel switching, oil fuel switching replace on failure, and electric resistance fuel switching)
- Working with vendors to provide promotional sales opportunities of equipment during the year. An example would be to have a vendor contribute an extra incentive in addition to the National Grid offering and co-market the sale.
- Researching co-branding energy-efficient equipment with respective manufacturers.
 - Allow manufacturers to use a “National Grid Product Mark” to promote the Energy Efficiency Programs and heighten public awareness of the Company’s brand and EE campaign.
- Assess ways to improve condensing boiler effectiveness such as providing a special incentivize to contractors who demonstrate that they are setting up systems with proper temperature drop and outdoor setback control.

v. Gas Conversion

The Company continues to receive high demand from residential customers to convert to natural gas heating options due to real or perceived cost benefits, convenience, or

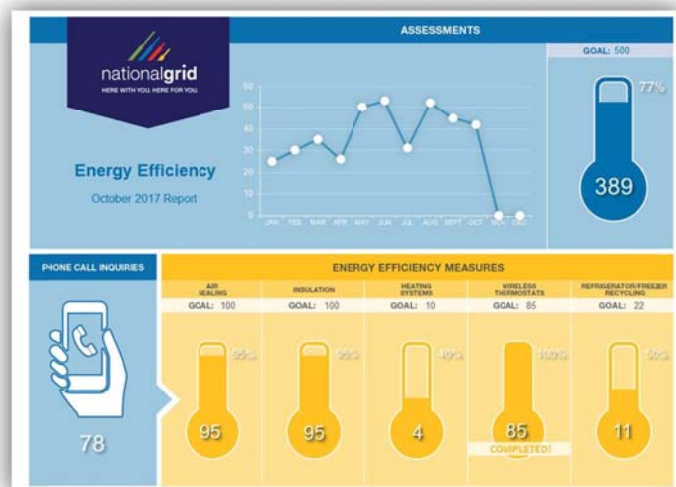
home improvements. In Rhode Island, the Company's Gas Sales Program is currently responding to this market shift, allocating resources to natural gas conversions, as well as piloting new implementation strategies, such as the Rhode Island Gas Expansion Pilot Program. Natural gas conversions present a strong opportunity for energy efficiency, especially with regards to the new heating equipment that is installed. In 2018, the Company will continue coordination between the High Efficiency Gas Program and the Gas Sales Program to promote high efficiency heating systems during the conversion process. Furthermore, the Company will utilize these conversions as opportunities to leverage its other energy efficiency offerings, such as the EnergyWise Home Energy Assessment, the HEAT Loan's 0% financing and other available financing options, to deliver an even better and more cost-effective product for the customer. This seamless integration will provide the maximum value for the customer at the time of conversion – when energy efficiency improvements make the most sense.

14. Initiatives

15. Community Based Initiatives

a. Overview

For the past four and a half years, the Company has been on-the-ground in 17 of Rhode Island's 39 cities and towns speaking directly with customers about the benefits of energy efficiency. The initial call to action was for customers to pledge to find four ways to save by making simple behavioral changes in their homes over the



course of approximately 20 weeks. Mayors, Administrators, and other local elected officials lent their voices to the message of efficiency through passage of resolutions, mailed communications, and attendance at events. When the participation goal was achieved, the town was named an *Energy Champion* and granted \$5,000-\$10,000 to be used for energy efficiency improvements on a municipal project.

The program evolved over the years; from a simple ask to save more energy by turning off lights to running a Video Challenge engaging thousands of students across the state and encouraging the creation of Energy Task Forces in local communities. For 2018, the Company proposes to continue this evolution in creating a slightly different community model focused more directly on participation and savings goals.

b. 2018 Goals

Early in the program year, two Rhode Island municipalities will be recruited and assigned goals based on historical performance (e.g. mini-split heat pumps installed, refrigerators recycled, weatherizations, home energy assessments, etc.). These municipalities will then be provided with start-up funding, comprehensive marketing toolkits, and supported with training to have a discussion about energy efficiency with their residents. Frequent check-in calls will allow the communities to speak with the Company regarding progress and share tactics and ideas with other participating towns. At the end of the year, towns will be rewarded with grant monies directly correlated to the increase in volume of the identified measures.

The Company will work closely with municipal leadership to identify community voices in the schools, local clubs and businesses. Unique to the initiative in 2018, the Company will engage more directly with large and small business owners within the community to not only engage them as energy saving advocates for their employees, but to also encourage their participation in the Company's C&I energy efficiency programs.

16. Residential Demonstration and Research and Development

a. Connected Device Demonstration

National Grid will continue its connected device demonstration project which began in 2016. The main focus of this pilot in 2018 will be to reduce program administration, marketing, software, and vendor costs while maintaining customer incentives in order to make this a cost effective program ($BCR > 1$). This will involve putting the demand response management system (software) and the vendor fees out for competitive bids. Early in 2018 National Grid will finish a load potential study and a study on the applicability of various residential appliances for demand response. The Company will expand its program to include any appliances that have a reasonable chance of being cost effective. The Company will also improve the customer experience in 2018 by including information on customers' demand response enrollments in their National Grid portal and by streamlining the enrollment process.

b. Energy Storage

The Company is going to spend 2018 working with a human-centered design company to conduct consumer research to better understand customer driven needs and opportunities for the intersection of distributed generation, battery storage, and electric vehicles. Currently there is very little marketplace understanding of consumer demands or desire for the suite of products. Ideally, the design firm will assist in developing varying consumer packages, at different price points, that can then be tested informally in a focus group setting. The consumer packages will be refined as a result of customer feedback and will then be sent out to a larger population of RI customers that have already invested in solar for their homes. National Grid believes the findings of this research could lay the foundation for a demonstration in 2019. The Company will also be observing activities in neighboring states and around the nation in order to cross-compare and share learnings across jurisdictions.

c. Emerging Lighting Controls

The Company seeks to evaluate the potential opportunity presented by lighting controls, paired with LED lighting, for customers. The prior year's demonstration consisted of 85 customers split between Rhode Island and Massachusetts receiving these lighting controls which included advanced functions like occupancy, vacancy, and dimming for wall switch applications. The Company will compare the economic and energy savings of lighting controls versus LEDs based on the savings recorded from the prior year's study. The lighting study demonstration showed signs of promising savings. Having an evaluation comparison would allow The Company to understand the additional potential savings of this technology.

This evaluation will test the value of offering lighting control technology and potential energy savings compared to the average savings from LEDs. The following metrics will be measured to determine the comparable value between lighting control technology and LEDs: customer total bill savings for electric, customer total energy savings (kWh) for electric, customer satisfaction, customer assessment of technology benefits, and likelihood of a customer recommending lighting controls and/or LEDs to fellow Rhode Islanders. The findings of this evaluation will help The Company to determine if lighting control technology offers an added benefit to customers compared to LED lighting.

d. Residential Energy Monitoring

The Company is interested in understanding the value of residential energy monitors. There are multiple vendors offering similar products to customers where users are able

to see real-time disaggregated energy usage and the dollars associated per appliance, heat source, and lighting. The Company would like to partner with vendor(s) that offer residential home energy monitors and deploy the devices to particular residential customers in Rhode Island based on the specific use cases The Company identifies as beneficial.

Initial interactions show the technologies used by vendors to identify energy disaggregation in homes and the value streams associated are unique to each device based on how users are expected to engage with the technology and the information that is provided to them. The Company is seeking to understand through this demonstration which technology best pairs with The Company's current programs and potential future program offering(s), and which value streams resonate with its customers the most. This demonstration is the first opportunity to understand the future, scalable offering of residential monitoring devices. The metrics of the demonstration will include, but are not limited to, measuring customers' energy usage, dollars spent/saved, customer satisfaction, usage patterns, device accuracy, and customer assessment of perceived technology benefits.

e. Zero Energy Homes

In 2017, National Grid worked with Rhode Island Housing and the Office of Energy Resources to issue an RFP for the development of a moderate income/income eligible zero energy home(s). This demonstration will be completed in 2018 and will be monitored for up to five years to determine its performance and areas for improvement. The data from this initiative will provide important information to guide the development of a zero energy offering for this market sector. Following the moderate income/income eligible demonstration, in 2018 the Company is proposing to develop a market-rate zero energy home that includes energy efficiency, demand response, solar, electric vehicle charging, battery storage, and smart devices to empower the homeowner to adjust their energy loads to meet the zero energy goal at the end of the year. This project would be used as a customer facing marketing and engagement tool for a period of time prior to its sale in order to obtain feedback on acceptance of zero energy homes. Based on the recommendations set forth in the Zero Energy Task Force Whitepaper, "Zero Energy Building Pathway to 2035" development of "proof of concept" or "demonstration projects" to showcase ZEB "Ready" design were recommended as a resource for demonstrating effective design, construction and operation of a zero energy home. In order to the meet the goal set out by the

Whitepaper of 100% of new construction to be ZEB after 2035, it is imperative to develop a program to support the market.

The Company will convene a small working group to design the “proof of concept” plan as well as the metrics that will be used to determine customer acceptance, energy efficiency and integration of renewables and controls. The “proof of concept” will potentially include both a new construction project and a renovation project and will engage all parties early in the process, and no later than the design stage. The “proof of concept”/“demonstration projects” may include a study of renewable systems and their performance, in addition to the efficiency elements.

The Company will provide technical support and incentives for high performance measures that will result in high efficiency design and technology that will result in a low energy use for the home. Support for ZEB growth in RI will require education and training for the building community, technical assistance, and improvements to codes and standards. Education for the homeowner will also be a priority as occupants will need to learn “how” to live in a zero energy home and maintain its efficiency and efficacy.

f. New Technology

The Company is open to receiving recommendations on promising new technologies, strategies, and programs that could be tested through future demonstration efforts. In order to provide a platform to receive suggestions and foster communication, the Company will work towards adding a suggestion box on the RI Energy Saving Programs webpage in 2017.

17. Marketing

a. Overview

The goals of the Company’s marketing efforts are to build awareness, educate customers, provide a positive customer experience, and drive participation in the Company’s efficiency offerings and services. The Company uses an integrated approach with general awareness tactics (i.e. print ads and radio) as well as digital and direct one-to-one tactics (such as e-mail and direct mail) at the program level to generate interest.

b. Delivery and 2017 Success

Rhode Island continues to see strong residential customer familiarity levels of energy efficiency, increasing 1 percentage-point year-over-year (as of July, 2017). In support of growing familiarity with energy efficiency programs, the Company launched energy efficiency advertisements on cable television for the first time in mid-June, 2017. This offline channel has shown significant impact on online metrics, tying broad-based, high-frequency awareness channels to consumer interest and intent to participate. During the first month, the Company saw a 77% increase in related search volume and a 13% participation increase in the featured program.

In addition for 2017, the Company set several key strategic marketing approaches to meet 2017 goals. These approaches were included as part of an overarching strategic marketing plan and were developed based on residential customer research, propensity modeling, media habits research and understanding behavior data. The key strategic marketing approaches include: targeting micro-segments, advancing the digital path to participation and activating influencers, discussed below.

i. Micro-Segment Targeting

In order to reach those customers who have yet to participate in the Company's energy efficiency programs, an even more targeted approach was developed to reach new audiences and meet 2017 objectives. Psychographic micro-segments were developed allowing for value-specific communications to be designed for each target audience. The first to launch was millennial new homebuyers (June '17). Targeted efforts were deployed to align with millennial media use including Hulu video advertising which resulted in strong completed video views. Targeting efforts for male do-it-yourselfers will launch in the fall and empty nesters in early 2018.

ii. Advancing Digital Path to Participation

Given increased customer demand and to enhance customers' experience digitally, the Company has improved digital platforms in several areas. To support customers while in their research phase online to find information on energy efficiency and the Company's programs, native in-feed / long-form paid content marketing was expanded. Digital content "hubs" were designed to enable customer research of energy topics, delivering in-depth content on energy efficiency products and programs through articles, videos and infographics and positioning National Grid as an energy resource. Native efforts have resulted in 15,435 engagements (i.e. when a customer has actively clicked through

an advertisement) with National Grid energy efficiency content (through June, 2017). Additionally, the Company has streamlined the customer experience and expanded the online purchasing path thru shopping promotions with special offers of Nest Wi-Fi thermostats, advanced power strips, LED's and room air purifiers. In total, nearly 5,000 products have been sold in RI via online shopping thru August 2017.

iii. Activating Influencers

The objective for this strategic approach is to develop influencer "channels" through community (customer) word-of-mouth and third-party validation. Residential customer case study videos are being used on Facebook to support key energy efficiency programs and the Company will be leveraging the media partnership with the Rhode Show to promote energy efficiency.

Overall the residential energy efficiency marketing activities year to date have delivered over 300,000 website visits to energy efficiency landing pages and more than 24,000 onsite actions that customers have taken on the National Grid website indicating interest including downloading rebate forms, clicking on signup buttons and mobile click-to-calls. In the fall of 2017, the Company will determine which strategic approaches to continue and/or modify for 2018. On an overarching basis, the Company will continue to elevate and broaden awareness marketing, continue to finely target specific audiences with appropriate select program offerings, and to continue to improve customers' digital experience as they explore energy efficiency content and purchase online. Trade allies play an important role in this work. National Grid's residential trade ally program and outreach is through a long-standing vendor who aligns homebuilders, residential contractors and other trade professionals with the Company's energy efficiency solutions, whether for new construction or HVAC. National Grid augments this vendor's reach through direct mail and digital promotion to the Company's in-house database of residential trade professionals to help increase awareness and engagement with the vendor's program.

For example, over the past year National Grid promoted 8 webinars specifically targeting RI trade allies. These webinars attracted more than 150 RI participants who contacted the Company for further information and/or support of upcoming projects. Vendor-sponsored webinar dates are being considered for 2018. The Company's series of targeted trade professional newsletters were also updated with a new look and feel.

Annual Open Reach¹¹ of these newsletters exceeds 40% for the RI based circulation of over 1,250.

In addition, print/digital trade advertising builds on the Life on the Grid messaging described above in ways that are directly relevant to the Trade community (“Business on the Grid”). The themes are built around how National Grid’s energy solutions help trade allies grow their businesses by providing more value to their customers -- by bringing National Grid in early, the Company can provide energy efficiency expertise, improve building performance, and lower project costs.

Since trade professionals have an advisory role to the end-customer, the Company created the National Grid Professional Network to best serve their specialized needs. It is a unifying umbrella affiliation that supports easy access to information, programs, and incentives that help these professionals incorporate energy efficiency into their projects. It is accessed through the Company’s recently introduced Trade-specific website (www.ngrid.com/ProNet) to serve as an organizing marketing framework to deliver fast, easy access to National Grid information relevant to trade professionals; the Company will continue to enhance this Trade-specific website in 2018.

c. Energy Innovation Hub

In 2017 the Company designed and built the Rhode Island Energy Innovation Hub, located in the southwest corner of the Dunkin’ Donuts Center, Providence, RI. The Energy Innovation Hub (“Hub”) is a community engagement destination designed to expand customer education and outreach and enrich the customer’s understanding of energy. The space and exhibits will reflect energy solutions accessible to all customers, innovative solutions for system reliability and will provide visitors with a vision of a sustainable future. Exhibits will present technologies available to create smart, energy-efficient homes, information about demand response programs, examples of renewable technologies, information on electric vehicles, storm management and core utility services. The exhibits are designed to encourage customers to take action and sign up for the many services and incentives offered to help reduce energy consumption. The Hub will also serve as a convening space for gatherings to discuss, and elevate, energy-related issues.

¹¹ “Annual Open Reach” represents the percentage of unique recipients who opened the newsletter during the past year.

The three main goals of the Hub are to educate customers about energy topics, empower customers to take action to sign up for ways to reduce their energy consumption, and to provide a convening space for organizations to discuss the clean energy future.

The Hub will be reserved on Thursdays for organizations to hold meetings in the space. The Company will proactively reach out to the following categories of organizations to encourage them to visit the Hub as well as reserve the space for meetings:

- State and local government
- Non-Profit organizations
- Businesses (owners, developers, tenants)
- Residents
- Energy Thought Leaders
- Universities and Colleges, Technical/Vocational Schools, Schools K – 12
- Trades
- Employees and Executives

By partnering with local colleges and universities National Grid envisions the Hub as a multi-faceted nexus thriving with innovation, excitement and passion. The Company intends to empower students and faculty to join us by integrating their disciplines in areas such as energy, engineering, hospitality, policy, marketing and community service. By including educational partners in the development of the Hub, National Grid will create stewards for the energy future of tomorrow.

18. Residential Measures and Incentives

The following tables list the groups of measures offered in the residential programs, their planned quantities and incentives. Each group may be comprised of many measures.

Electric Programs			
Program	Measure	Units	Incentive
EnergyWise Single Family	Aerator - Dual Fuel Only	100	Average Incentive based on measure mix
	Air Sealing Kit (Oil)	1000	
	FIXTURES	400	
	LED Bulbs	220000	
	LED Fixture	250	
	LED Outdoor Fixture	500	
	Pre-Wx	100	
	Refrig rebate	60	
	Refrigerator Brush	6300	
	Showerhead	250	
	Smart Strip	13000	
	Thermostat - Elec Heat only	300	
	Thermostat - Oil Only	60	
	Torchiere	15	
	WiFi Thermostat	100	
	WiFi Thermostat - DR Enabled	150	
	Wx - GAS	2275	
	Wx - OIL	1823	
	Wx Elec - Elec Heat only	183	
	Pipe Insulation	30	
	Participant	10000	
EnergyWise Multifamily	Participant	6000	Average Incentive based on measure mix
	Aerator	569	
	Aerator Oil	161	
	Air Sealing- Electric with AC	1461	
	Air Sealing - Oil	51	
	Common External LED Fixture	1457	
	Common External Reflector	217	
	Common Internal LED Fixture	3955	
	Common Internal Reflector	651	
	Dwelling External LED Fixture	31	
	Dwelling External Reflector	3	
	Dwelling Internal EISA Exempt	6595	
	Dwelling Internal Reflector	2630	
	Insulation-electric with AC	1090	
	Insulation-Oil	41	
	Pipe Wrap Domestic Hot Water- Oil	62	
	Pipe Wrap Heating Oil	14	
	Refrig rebate	19	
	Showerhead Elec	221	
	Showerhead Oil	66	
	Smart Strip	4225	
	Thermostat Elec with AC	2263	
	Thermostat-Oil	37	
	TSV Showerhead-Electric	63	
	TSV Showerhead-Oil	39	
	Common External LED Bulbs	1301	
	Common Internal LED Bulbs	4368	
	Dwelling Internal LED Bulbs	15840	
	Custom	11	
	Vending Miser	9	

Residential New Construction	CODES AND STANDARDS	1	Average Incentive based on measure mix
	LED Bulbs	10000	
	Renovation Rehab CP	50	
	Renovation Rehab Tier 1 Home	40	
	Renovation Rehab Tier 2 Home	2	
	Renovation Rehab Tier 3 Home	2	
	Tier 1 Home	85	
	Tier 2 Home	60	
	Tier 3 Home	7	
ENERGY STAR® HVAC	Central Air QIV	65	\$ 175.00
	Central Air SEER 16.0 EER 13	376	\$ 250.00
	Central Air SEER 18.0 EER 13	18	\$ 250.00
	Down Size 1/2 Ton	20	\$ 250.00
	Duct Sealing	5	\$ 100.00
	ECM Furnace	328	\$ 100.00
	Circulator Pump	2400	\$ 100.00
	Mini Split Heat Pump QIV	27	\$ 175.00
	Heat Pump SEER 16.0 EER 12 HSPF 8.5	15	\$ 250.00
	Heat Pump SEER 18.0 HSPF 9.6	13	\$ 500.00
	Mini Split HP SEER 18.0 HSPF 9	400	\$ 250.00
	Mini Split HP SEER 20.0 HSPF 11	551	\$ 500.00
	Heat Pump Water Heater <55 gallon, Electric	750	\$ 750.00
	WiFi Enabled Thermostat with Cooling - Gas	750	\$ 25.00
	Oil Fuel Switching	15	\$ 3,000.00
	Oil Fuel Switching ROF	5	\$ 3,000.00
	Electric Resistance Fuel Switching	25	\$ 3,000.00
ENERGY STAR® Products	Dehumidifier Rebate	400	\$ 30.00
	Dehumidifier Recycling	150	\$ 30.00
	Energy Star Dryer	300	\$ 50.00
	Freezer Recycling	300	\$ 63.00
	Ladybug shower adapter electric hot water	40	\$ 11.00
	Ladybug shower adapter Gas Hot Water	40	\$ 11.00
	Ladybug shower adapter Oil or Propane Hot Water	10	\$ 11.00
	Pool pump - 2 speed	50	\$ 250.00
	Pool Pump - variable	100	\$ 600.00
	Refrigerator Recycling	2000	\$ 63.00
	Refrigerator Recycling (Primary)	2500	\$ 63.00
	Roadrunner Showerhead Gas Hot Water	75	\$ 15.00
	Roadrunner shower head electric hot water	100	\$ 15.00
	Roadrunner Showerhead Oil or Propane Hot Water	75	\$ 15.00
	Room Air Cleaners	120	\$ 40.00
	Smart Strip	5000	\$ 20.00
	Advanced Power Strip	100	\$ 35.00
	Room Air Conditioner 10.8	100	\$ 40.00
ENERGY STAR® Lighting	LED (15,000) -Hard to reach	120000	\$ 2.00
	LED Bulb (15,000)	600000	\$ 1.50
	LED Bulb (Hard to Reach)	40000	\$ 3.50
	LED Bulbs	200000	\$ 2.75
	LED Bulbs (EISA EXEMPT)	20000	\$ 3.50
	LED Fixture	220000	\$ 9.00
	LED Outdoor Fixture	2300	\$ 9.00
	LED Reflectors	240000	\$ 5.00
	LED School Program Bulb	8000	\$ 6.50
	School Program	120000	\$ 3.50
	Speciality Bulbs	36000	\$ 7.50

Home Energy Reports	New Mover electric	23135	\$ 8.65
	New movers dual fuel	13736	\$ 8.65
	Opt-out dual fuel	99951	\$ 8.65
	Opt-Out electric	118910	\$ 8.65
	Refills	29268	\$ 8.65
Single Family - Income Eligible Services	Window AC Replacements	550	Average Incentive based on measure mix
	Appliance Removal	5	
	Dehumidifier Rebate	30	
	DHWater Measure (elec)	20	
	DHWater Measure (gas&other)	20	
	DHWater Measure (OIL)	20	
	Participants	2750	
	Replacement Freezer	165	
	Heat System Replacement	270	
	LED Bulbs LI	63250	
	Refrig rebate	1760	
	Smart Strip	3575	
	Waterbed	3	
	Wx DelFuel	440	
	Wx Elec	35	
EnergyWise Income Eligible Multifamily Retrofit	Aerator- Oil	320	Average Incentive based on measure mix
	Air Sealing- Electric with AC	2	
	Air Sealing- Oil	102	
	Common External LED Fixture	1189	
	Common External Reflector	468	
	Common Internal LED Fixture	4999	
	Common Internal Reflector	43	
	Custom	20	
	Dwelling External LED Fixture	29	
	Insulation - Electric with AC	90	
	Insulation- Oil	82	
	Participant (Non-energy Benefits)	4800	
	Pipe Wrap Domestic Hot Water- Oil	122	
	Pipe Wrap Heating Oil	41	
	Refrigerator Rebate	65	
	Showerhead Electric	27	
	Showerhead Oil	210	
	Smart Strip	1802	
	Thermostat AC Only	2	
	Thermostat Elec with AC	2	
	Thermostat Heat Pump	2	
	Thermostat Oil	205	
	TSV Showerhead Electric	186	
	Dwelling External Reflector	20	
	Dwelling Internal EISA Exempt	1317	
	Dwelling Internal Reflector	122	
	Common External LED Bulbs	866	
	Common Internal LED Bulbs	3088	
	Dwelling Internal LED Bulbs	7137	
	Vending Miser	4	

Gas Programs			
Program	Measure	Units	Incentive
EnergyStar® HVAC	BOILER RESET	25	\$ 100
	Boiler90	250	\$ 450
	Boiler95	350	\$ 800
	COMBO CONDENSING	100	\$ 650
	COMBO CONDENSING 95	375	\$ 1,200
	Furnace95ECM	225	\$ 300
	Furnace97ECM	135	\$ 500
	WATER HEATER - ON-DEMAND 82	225	\$ 250
	TANK WATER HEATER 67	30	\$ 100
	WATER HEATER - ON-DEMAND 94	250	\$ 600
	WiFi Thermostat - cooling and htg	300	\$ 75
	WiFi Thermostat - gas ht only	300	\$ 100
	Programmable Thermostat	100	\$ 25
	Combo Furnace	300	\$ 450
EnergyWise	Aerator	150	Average incentive based on measure mix
	Weatherization	2,275	
	Air Sealing Kit (Gas)	1,000	
	Showerhead	260	
	Pipe Wrap	1,250	
	THERMOSTAT	400	
EnergyWise Multifamily	WiFi THERMOSTAT	95	Average incentive based on measure mix
	Air Sealing	3,914	
	Custom Non-Lighting	30	
	Participant	2,500	
	Faucet Aerator	1,517	
	Insulation	3,511	
	Low-Flow Showerhead	593	
	Pipe Wrap (Water Heating)	509	
	Programmable Thermostat	480	
	TSV Showerhead	346	
Home Energy Reports	WiFi thermostat gas	140	
	New movers dual fuel	13,738	\$ 3.80
	Opt-out dual fuel	73,908	\$ 3.80
	Opt-out gas only	16,971	\$ 3.80
Residential New Constructon	Refill	34,383	\$ 3.80
	CODES AND STANDARDS	1	Average incentive based on measure mix
	CP	15	
	CP-DHW	15	
	RR CP	70	
	RR CP-DHW	70	
	RR Tier 1	3	
	RR Tier 1 - DHW	3	
	RR Tier 2	60	
	RR Tier 2 - DHW	60	
	RR Tier 3	1	
	RR Tier 3 - DHW	1	
	Tier 1	31	
	Tier 1 - DHW	31	
	Tier 2	75	
	Tier 2 - DHW	75	

Gas Programs			
Program	Measure	Units	Incentive
Single Family - Income Eligible	Heating System Replacement	175	Average incentive based on measure
	Weatherization	500	
Income Eligible Multifamily	Air Sealing_LI	759	Average incentive based on measure mix
	BOILER Commercial_LI	33	
	BOILER_LI	15	
	CUST NON-LGT_LI	40	
	Faucet Aerator_LI	2,549	
	FURNACE_LI	15	
	Insulation_LI	774	
	Low-Flow Showerhead_LI	1,126	
	Participant (NEB)_LI	3,500	
	Pipe Wrap (Water Heating)_LI	701	
	Programmable Thermostat_LI	780	
	TSV Showerhead_LI	294	
	Wifi Thermostat gas_LI	20	

2018 Commercial and Industrial (C&I) Energy Efficiency Solutions and Programs

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1. Introduction

The 2018-2020 Three-Year Plan details four central principles that encompass an advanced and innovative approach to serving commercial and industrial customers and the building industry at large. These four principles are apparent in all aspects of the 2018 Plan and incorporated in the planning process, which included many brainstorming sessions from internal teams to external stakeholders. In addition, each of the Company's strategies, programs and initiatives are focused on meeting the needs of customers, the environment, and preparing for the future. Below are the four key priorities the Company has identified in the 2018–2020 Three-Year Plan.

Customers - Deliver comprehensive services encompassing all market segments and customers. Such services will enable customers to control their energy use, reduce their bills, and help support their financial well-being.

Least Cost - Deliver energy efficiency services as cost-effectively as possible through optimizing finance and promoting upstream initiatives. Continuing to deliver cost effective energy savings under Least Cost Procurement will create cost savings to all customers, while creating economic benefits that create and maintain local jobs and businesses.

Environment - Provide solutions that minimize greenhouse gas emissions and contribute to Rhode Island's clean energy policy goals, including the Resilient Rhode Island Act.

Future – Innovate to capture savings from new technologies and strategies to position energy efficiency programs for the future including the integration of energy efficiency with demand response, renewable energy, and smart grid technologies. This includes incorporating outcomes from the Rhode Island Power Sector Transformation Initiative and Docket 4600.

Affordability and financing for the Company's customers are important criteria to achieve all the energy efficiency strategies and innovations that the Company is proposing in this plan. In addition to the Company's On Bill Repayment (OBR) initiative, the timing in Rhode Island is right for enhancing affordability through the Rhode Island Infrastructure Bank that is further enhancing energy efficiency investments for its customers. In the 2017 plan, in addition to the successful collaboration between the

Company's financing and the Efficient Buildings Fund (EBF), the Company highlighted the recently launched C-PACE program through RIIB that allows for additional financing for commercial building customers. This program will continue in 2018.

a. Structure of C&I Energy Efficiency Programs and Initiatives – Attachment 2

Four Main C&I Themes

1. **Better Customer Experience:** The Company believes that customer experience is prioritizing the customer's wants and needs and keeping central to the Company's business strategy for energy efficiency programs. Understanding the customer journey is about learning what customers experience from the moment they begin considering energy efficiency, and then working to make the journey toward energy efficiency solutions as simple, clear, and efficient as possible.
2. **Market Sector Approach:** The reasoning for this approach is simple: success lies in demonstrating a deep understanding of the customer's requirements, of their needs that are directly shaped by the industry and geographies in which the customers operate, and on the industry or sectors strategic and commercial pressures. A sector approach allows us to customize solutions that fit the customers' needs and increase participation in energy efficiency.
3. **Affordability and Financing:** An important goal of The Company's programs is to help minimize these upfront project costs so building owners are encouraged to invest in more comprehensive energy efficiency improvements and significant retrofits.
4. **Education, Awareness and Trainings:** Education, information and awareness are the first steps to making informed decisions. The Company will focus on all opportunities that help customers in RI become aware, educated and informed about energy efficiency so that they can participate in energy efficiency and help the state achieve its environmental goal.

Three Types of Programs

1. **Large C&I New Construction –** Focuses on offerings that target ground up new construction, major renovations, tenant fit-outs and end of life replacement equipment.

2. Large C&I Retrofit – Focuses on all services and technologies towards retrofits needed for existing buildings.
3. Small Business/ Direct Install (SMB/DI) – Focuses on providing turn-key solutions to many small businesses.

It should be noted that the offerings for Large C&I New Construction and Retrofit Programs are also available to small business customers.

The Appendices provide further details to the three programs mentioned above. The following figures and tables are available in the appendix:

1. Sample list of custom measures for new construction and retrofit programs
2. Program logic model for retrofit program
3. Program logic model for new construction program
4. Goals and incentive description of each of the electric sub-programs
5. Goals and incentive description of gas program measures

2. Central Themes for Efficiency

a. Better Customer Experience & Analytics

i. Improving Efficiency in Project Cycle Times

The Company is committed to providing its customers with a more expedited project initiation and enrollment and incentive application (transactional) experience. The Company's internal Process Excellence Team made significant progress in applications processing, and the building Technical Assistance (TA) review process. For example, a revised post inspection protocol is expected to reduce turnaround time after project completion, thereby ensuring faster incentive payment to customers. In addition, there have been reductions in cycle times from application creation to project incentive payment. Beginning in late 2017, the Company will begin the design and implementation of a new web-based portal for customers to create and submit fully digital incentive applications replacing the PDF based forms that have been used for years. This new portal will greatly improve the customer experience, accelerate application review and incentive payments, and potentially increase participation.

The following section describes the four broad areas mentioned previously and how they will connect with all the Commercial and Industrial (C&I) Efficiency Programs and

strategies: Large Commercial New Construction, Large Commercial Retrofit and Small Business Direct Install.

ii. Data Analytics

National Grid, like many other utilities and other companies around the globe, is focused on how data can improve its decisions, inform its strategic planning, and understand its customers more completely. The Company plans to use customer intelligence software platform that will help with customer insights and enhance customer satisfaction. The software platform enable sales, marketing, and account management teams to connect the right customer to the right offer at the right time, driving customer conversion. This platform will also allow the Company to drive higher awareness and participation in programs and allow for more impactful interactions with customers that deepen the value of energy projects. The Company will continue to examine new pathways to obtain more detailed information on its large customers that will drive a more targeted approach to customers and hence higher participation.

iii. Tools for Customers' Management of Energy Usage

The Company intends to help customers access their energy data to allow for greater awareness of energy consumption. The Company will seek to achieve this through the various methods described below:

iv. Automated Benchmarking Systems

National Grid has been working diligently with internal partners to develop a path towards automating data uploads into Energy Star's Portfolio Manager. The Company acknowledges automated usage data transfer to customers as an important tool in the future for building labeling intentions, supporting prior OER commitments to support state/municipal facilities improvements, and as a tool for helping customers to better understand their energy usage. The Company currently is in the process of automating data uploads to Portfolio Manager, for customers. The process is slated for completion in early 2018 whereby customers will be able to automatically upload aggregate, whole building energy usage data, both electric and gas, onto the Portfolio Manager and will allow building owners and stakeholders to benchmark energy usage and performance and compare usage to similar buildings nationally. This process will also support the City of Providence's building energy reporting and disclosure ordinance that the City is planning to implement in 2018. The ordinance will require building owners of large and medium sized buildings to report their annual energy use. The goal of this ordinance is to make building owners and operators more aware of their energy usage and help

them improve energy efficiency of their buildings. . The Company is currently supporting the City’s stakeholder process for the co-creation of this ordinance.

The Company will support benchmarking with customer support on automating data uploads as well as provide access to EPA training on Portfolio Manager. The Company will work with the City of Providence and other stakeholders to explore being part of the 2030 Districts Network. This goal of this network is achieve 50% greenhouse gas reductions, through policy and projects, related energy, water and transportation.

v. Green Button

The Green Button initiative is an industry-led effort that responds to a White House call-to-action to provide utility customers with easy and secure access to their energy usage information in a consumer-friendly and computer-friendly format. Customers are able to securely download their own detailed energy usage with a simple click of a literal “Green Button” on electric utilities’ websites.¹ In 2016-2017, more than 500 C&I and residential customers downloaded their energy use data with Green Button. This included both gas and electric customers. In 2018, National Grid will explore engaging with customers who download their energy use data with automatic email outreach that details how the programs can help them manage their energy use and achieve their energy goals.

vi. Building Labeling

The Company will continue to work with the Office of Energy Resources (OER) and other stakeholders to identify strategies for building labeling in the commercial and multifamily real estate sectors in Rhode Island. Building labeling will provide greater transparency in the energy performance of a given building. This initiative, currently led by OER, is working to establish building labeling parameters and mechanisms for commercial and multifamily properties. This will likely require the linking of the Company’s energy usage database with operational and asset based rating systems that property owners will use to benchmark their buildings. The Company will continue to work closely with OER to support property owner and tenant access to usage data. Benchmarking and Labeling efforts will also help towards achieving Zero Energy Building (ZEB) goals for existing buildings as detailed in the Company’s ZEB white paper (see more details in the ZEB section below).

¹ <https://energy.gov/data/green-button>

b. Market Sector Approach

Specific enhancements to some sectors are highlighted below:

- Grocery/Supermarkets
- Industrial/Manufacturing
- Municipal & State
- Hospitality (Restaurants & Lodging)
- Specialty buildings including: Farm/Agriculture and Extended Care Facilities
- Hospitals
- Colleges and Universities
- Commercial Real Estate
- Multifamily

i. Approach to Large and Mid-Sized Customers Based on Usage

The Company's sales and operations teams will continue to address the unique needs of customers depending on their annual usage, peak demands and market segmentation. Customers with annual average demand of 500 kW or greater and 75,000 therms or greater are classified as large and are managed by individual sales representatives. These customers are supported by Strategic Sales staff who are backed by technical experts for that particular customer type. Since 2015, customers with annual average monthly peak demand between 200 to 500 kW and less than 75,000 therms are being served through the Channel Sales group.

Both sales teams work with customers either directly or through project expeditors and vendors and offer pathways to upgrade various systems within a facility including, not limited to, lighting, HVAC, and compressed air. They can also call on the Company's Technical Assistance (TA) Vendors to help the customer with a more comprehensive look at their entire facility where appropriate. In many cases, this more comprehensive look helps customers uncover opportunities for savings previously unknown to them or beyond common measures.

In some cases the sales teams customize solutions to meet the needs of the customers. Sales may work with large customers to hold and/or manage incentives in escrow accounts for future EE. In addition, National Grid also has an upstream program from C&I customers that is targeted at moving low cost inefficient products out of marketplace and high efficiency into market. This program is open to all C&I customers.

The sections below provide details on each of the current market sectors

a. Grocery Sector

The Company will continue to provide targeted energy savings opportunities to Rhode Island's grocery customers through the EnergySmart Grocer (ESG) Initiative. ESG has been in operation since 2013 and the third party contractor has been working with grocers to identify a wide array of retrofit and new construction opportunities. The ESG initiative delivered over 6.9 million kWh and 49,000 therms of savings in 2015 as part of its strongest year to date and reflects several large projects which pushed delivery well above goals for that year. ESG is showing solid delivery through June 2017 towards the 3.36 million kWh 2017 goal. Therm savings are projected at 13,000 therms for 2017. In 2018, this initiative is expected to save a total of 3.36 million kWh and over 13,000 therms.

The customers served by this initiative include a combination of local, regional, national and even international grocers and other retail establishments who sell food and have heavy refrigeration usage. ESG provides "unitized" incentives – i.e., \$ per unit physical unit such as linear feet, square feet, horsepower, etc. – for the most common measures relevant to these customers which provides an easy to understand offering which leads to easier project planning and investment decisions. ESG also offers custom project engineering support to help customers pursue all cost effective measures in their facilities.

The measure mix to date includes infiltration measures (night covers, strip curtains), lighting (LED case lighting, LED shelf or end-cap lighting, LED fixtures or solutions for walk-in refrigeration, LED parking lot lighting), refrigeration (adding doors to open refrigerated cases, EC motors in refrigerated walk-ins and cases), refrigeration controls (floating head pressure control and floating suction pressure control), and HVAC measures (controls and VFD's). ESG has delivered over 59% of its savings from refrigeration measures, 21% from HVAC measures, and 18% from lighting measures. The remaining savings came from other areas.

ESG is considering adding a hot water heat reclaim measure to the offering and is in the process of reviewing the calculation methodology. Additional new technologies being brought forward include: permanent magnet synchronous motors, an even more efficient motor than existing technologies used in fractional horsepower applications, as well as hybrid condensers that utilize evaporative pre-cooling during warmer months for

more efficient refrigeration system operation. In addition, ESG will identify supermarket dishwasher demo projects through its customer contacts. (This is highlighted in later sections under Demonstration Projects)

Through implementing ESH over the last few years, the Company learned that marketplace understanding has grown tremendously through targeted outreach and is reflected in the strong delivery of the initiative. The Company also learned that greater integration across other offerings like the Small Business program could lead to better customer service and more successful projects. As a result, the Company has begun to incorporate ESG services for all small grocery customers as well.

b. Municipal and State Buildings

The three year (2012-2015) DOE funded Public Energy Partnership (RIPEP) led to approximately 123 municipal and state buildings reaching an average of 28.6% projected energy reduction, far beyond the DOE goal of 20% for the partnerships. In combination with the Efficient Buildings Fund (EBF) through RIIB and the Company's existing collaboration with municipal customers, the Company forecasts continued momentum in energy efficiency in the municipal sector. In addition, incentives and technical support will continue to be offered in 2018, in specific areas including:

c. Project/Energy Management Support

In 2016, the Rhode Island Infrastructure Bank's (RIIB) Efficient Buildings Fund (EBF) was created to provide capital for comprehensive projects. Qualifying projects will tend, by their very nature, to be costly and technically complex. The time and expertise required to identify, develop, and oversee these projects can be beyond the resource capacity of many towns and cities. In 2016 the Company supported several municipalities that applied for EBF applications. Support included reviewing project submittals, supporting city/town Council approvals, implementation planning, reviewing efficiency project proposals, RFP development, and bidder selection.

The support for energy efficiency project implementation and street lighting that the Company and its vendor provided in 2016 and 2017 produced significant results. Municipalities have recognized the value of this type of support as it provided a trusted partner to bring the time and expertise municipalities lack to identify, develop and oversee complex projects. In order to continue to serve this sector, there are several support mechanisms in place for 2018:

- RIIB has hired project management support to provide auditing and project installation services to municipal customers. URI will be supporting municipalities as they learn to use Portfolio Manager as well as meet the EBF's energy reporting and energy management plan development requirements.
- The Company will continue to support municipal engagement in OER and RIIB programs like vendor selection, engineering support, and implementation of upgrades through the EE programs.
- The Company will also provide energy audits to select municipal/school/wastewater customers to support their EBF applications. In the past few years the Company has provided in the range of approximately 50 energy audits annually.
- For financing in this sector, the Company will continue to offer On-Bill Repayment for electric and gas measures. The Company and other partners such as OER will assist RIIB with municipal projects currently enrolled in the EBF program through RIIB, and on municipal projects that subscribe in 2018. The Company plans to serve on the committees in order to ensure that customers have access to finance, that the process is easy, and that the Company and RIIB are working with customers in a coordinated way.

d. State SEMP

In June 2016, a joint Memorandum of Understanding (MOU) was signed between the Company, OER, Department of Administration (DOA) and Department of Capital Asset Management (DCAMM). The purpose of this three year period MOU is to strengthen the State's commitment to economic growth and climate change mitigation, and to lead by example through the Governor's Executive Order (EO 15-17) that requires all State facilities to reduce their energy consumption by 10% by 2019. Consistent with this EO, this MOU is designed to integrate strategic energy planning across State facilities and to leverage the Company's programs and best practices to achieve a minimum cumulative energy savings of ten percent (10%) below fiscal year 2014 levels by the end of fiscal year 2019. This MOU pertains to building projects (both retrofits and new construction) for State facilities. Specifically in 2018, the objective of this MOU states electric and gas reduction goals. These goals are an increase of 8% for electric savings and 9% for gas savings from 2017.

National Grid plans to assist the state SEMP with:

- Identifying and prioritizing projects from the two dozen scoping studies and retro-commissioning reports that have been completed thus far.
- Working with agencies and purchasing departments to develop and request qualifications and proposals for the fiscal year ending June 30, 2018.
- Identifying remaining projects and proposing a budget for the remaining buildings to be included in the FY 2019 budget (due in January, 2018).

In addition, National Grid will continue to offer building operator certification trainings.

In 2018, National Grid proposes to try multiple approaches to delivering energy efficiency based on building size and building function:

- For smaller buildings, one measure such as lighting will be installed in multiple facilities. This will provide economy of scale for 8-15 buildings.
- Multiple measures (such as lighting, HVAC, etc.) will be installed in one or more buildings.
- Within some of the facilities, the Company will have a more comprehensive approach, following the Lead by Example initiative. These measures will include Lighting, HVAC, controls, Photovoltaics, etc.

e. Manufacturing/Industrial

The industrial sector accounts for one-third of the total U.S. energy consumption, and as such represents a substantial opportunity for cost-effective energy savings. Effectively managing and reducing industrial energy use has increasingly become a key priority.

The Industrial Initiative was started in 2013 as a demonstration project and enrolled seven customers over the course of 2013 and 2014. During the demonstration phase, the initiative surpassed its goals by identifying more than 800,000 therms and 7.5 million kWh in estimated² technical potential savings. In addition, this helped the Company build relationships and trust with its top industrial customers in Rhode Island. In 2015, National Grid formalized the program and expanded outreach to include 17 large industrial/manufacturing customers. From 2015-2018, 47 electric customers with complete or active projects in Rhode Island represent 16,000 annual MWh and 133

² Technical potential is an ideal scenario which sums all energy efficiency measures that are feasible given technological limitations. Typically, only a portion of this potential is achievable given cost-effectiveness, program design structure and customer limitations - such as scheduling and availability of capital.

applications. Gas participation over the same period of time consists of 328,000 annual therms and 34 applications.

The National Grid Industrial Initiative assists busy plant managers identifying process improvements and energy efficiency projects. Tight budgets and limited staff time often make it difficult for businesses to take advantage of the savings these projects provide. The Industrial Energy Advisors' services are targeted towards large industrial facilities with significant electric and/or gas usage and are available at no cost to the customer. Unlike most commercial buildings, industrial facilities are likely to find that the majority of their energy consumption is production-related, instead of lighting or HVAC. The Industrial Initiative team focuses on process measures including:

- Free Cooling on Process Chillers
- Heat Recovery Projects
- Thermal Oxidizers
- Process Controls and Automation
- Drives, Motors, VSD Compressors
- Lighting Upgrades

As a result of the Industrial Energy Advisors' engagement, the proportions of process-related projects have increased, along with overall savings.

In 2017, the Company continues to maintain the key features of the initiative and results thus far have been extremely promising.

Current program components and highlights:

- An industrial-specific technical expert team from the Company's specialty engineering partner provides support to its sales team and technical solutions to its industrial customers. These solutions include: process energy related measures, management change recommendations, project management support, and other HVAC and lighting related options.
- A scoping study of the technical and energy management opportunities for the facility, at no cost to the customer. If a detailed analysis, in addition to a scoping study, is required (e.g. a detailed compressed air study), the costs of the study are shared with customers on a case by case basis.
- An incentives package that meets customer payback and financial hurdle rate criteria.

- Customer needs assessment: The sales team and the Company's engineering partner will conduct needs assessments in order to provide the best solutions for its customers. The Company recognizes that some customers may need more assistance in management of their energy, such as examining interval data anomalies and working to correct them (frequently scheduling or equipment setting errors) before implementing energy saving measures. National Grid will categorize customers based on their levels of engagement and will develop different implementation paths based on each customer's needs.
- National Grid will also provide project progress tracking and support to overcome implementation barriers.

In 2018, National Grid and its engineering partner plan to reach out to more customers as well as following up with customers who have successfully completed projects to see if more collaboration can be done.

ii. Small Manufacturing/Industrial

The Company continues to serve small and medium industrial/manufacturing facilities through its direct install and large retrofit programs in Rhode Island. The Company also works closely with vendors and trade allies to support energy efficiency upgrades in these industrial facilities. In 2018, the Company will continue working towards identifying go-to market strategies for small medium customers, which makes up 90% of our commercial accounts.

a. Restaurants

The Company will continue to offer energy efficiency services to its small to medium sized restaurants through the Direct Install and Large retrofit/new construction programs. In addition to this, the Company implemented a new strategy for chain restaurants in 2016, which was very successful. The strategy was to approach a corporate office with an energy efficiency action plan that can be tailored to the needs of a particular chain. An MOU is then signed between the corporate office and the Company that outlines the plan. The ideal candidates for this initiative are chain restaurants, with 24/7 operations and large number of stores. In 2016-2017 a large franchise restaurant in Rhode Island participated in this initiative specifically designed for chains and franchises. 88 restaurant locations have participated in this program so far, with total annual savings of 3,629,347 kWh from this initiative. Efficiency measures

include, lighting, HVAC, refrigeration and restaurant equipment. In 2018, the Company will look to expand this initiative with other restaurant chains.

b. Lodging

Lodging facilities in Rhode Island have participated in the Company's programs in the area of lighting. However, there is potential for more savings. The Company is researching several areas that could help this segment reduce energy consumption even further. The Company is looking at simple changes such as more efficient pool pumps to more complex interventions such as ozone or polymer bead laundry washing systems and efficient HVAC units. There is also the potential in room key controls for lighting, electronics, and HVAC that are very popular in hotels around the globe. The Company currently has offerings for some of these items and needs to further investigate other options. The Company plans to engage with other utilities that have robust efficiency programs in this industry to learn about go-to-market strategies in the hospitality/lodging sector.

iii. Specialty Buildings

Extended Care Facilities such as Nursing Homes/Assisted Living

The Company has, over the past few program years, investigated different ways to try and serve nursing homes, rehabilitation facilities, and assisted living spaces beyond simple lighting retrofits. The latest attempt included trying to share the cost of an experienced energy manager to help these customers jumpstart project development. It was not successful. The Company's investigations turned up three simple truths:

1. These facilities want to pursue energy efficiency and comfort upgrades to their facilities.
2. Nearly every one of these facilities did not have the resources to even consider a cost share of investigating energy efficiency opportunities, let alone act on them.
3. The Company did not have a tool, beyond the limited resources of National Grid's OBR, to help them deal with these issues.

However, there is now Commercial Property Assessed Clean Energy (C-PACE) as a tool. C-PACE further defined in the "Affordability and Financing" section below, allows customers access to low cost private capital for terms that greatly exceed most conventional business loans. It also allows the customer to capitalize all costs related to the project. This means that the Company now has a solution to largest barrier to moving forward with deeper and broader efficiency measures in this segment. These

measures include, but are not limited to, HVAC improvements, envelope improvements, energy management systems, energy efficient laundry systems, and Combined Heat and Power (CHP).

Starting in 2018 National Grid, the Rhode Island Infrastructure Bank (RIIB), and various parts of the RI state government, including the treasurer's office, will be working together to advance this solution in this customer segment. This new financing tool and increased attention from various stakeholders will help to dramatically increase the number and diversity of energy efficiency projects in this vertical segment.

Farm/Agriculture

A few years ago OER and National Grid began an effort to serve farm and agricultural customers in the state of Rhode Island. Under the informal agreement between OER and the Company an allocation of Regional Greenhouse Gas Initiative (RGGI) funds was used to perform audits at pilot farms, train auditors, develop a list of technically sound measures, and create a fund to pay for energy efficiency incentives for delivered fuels (oil, propane). National Grid agreed to cover electric and natural gas energy efficiency incentives in accordance with Company policies.

In 2016, audit reports and recommendations were delivered to all nine pilot farms. Several farms have commenced with installing measures and the rest are evaluating which measures are best for their specific situations. National Grid and OER also created co-branded marketing pieces for this initiative. In early 2017, National Grid's vendor for this program began calling a list of farm/agricultural facilities, provided by OER, to educate them about the program and encourage farms to complete an audit of their facilities. The Company will continue its efforts to market jointly via web, email and in-person at farmers markets to engage with farms, jointly with OER, in 2018.

iv. Multifamily Sector

The Multifamily Initiative will continue to provide joint residential and commercial energy services to condominiums and apartment complexes for energy efficiency upgrades. The C&I program specifically offers incentives for master metered gas measures that typically include boiler reset controls and insulation and air sealing. The remaining areas are addressed through residential incentives via a common point of contact. The Company anticipates a higher volume of projects in the multifamily new construction space to come through the C&I programs in the next few years and is

currently exploring ways in which to streamline the application process for the Multifamily program.



Wethersfield Commons, RI – Multifamily Energy Efficiency

In collaboration with National Grid, RISE contractors completed upgrades for participating residents, which included adding attic insulation and sealing air leaks throughout their units. Upgrades also included smart thermostats, that provided more comfort and control, exterior lighting improved safety and low-flow shower head reduced water use and energy efficiency for residents.

v. Approach to Other Market Sectors

Hospitals: The Company will continue to work with Rhode Island's five largest hospitals (all under one partnership) through the multiyear Strategic Energy Management Planning (SEMP) initiative (refer to the SEMP section for more details). The medium sized healthcare facilities will continue to be addressed through the channel sales group.

Colleges and Universities: These are currently served through either the Company's large commercial programs with a dedicated sales team or the Company's SEMP initiative. With a master-metered portfolio of buildings within the campus, most universities are tied to sustainability goals and climate action plans to reduce their

greenhouse gas emissions. The Company's SEMP initiative allows enrolled university customers to engage in multi-year campus energy planning and assists them in identifying comprehensive and long-term energy efficiency opportunities. The Company will continue to explore opportunities for further SEMP university customers. Besides SEMP, the Company continues to provide energy services to universities in RI.

Commercial Real Estate and Offices: The Company's sales team continues to see many challenges and barriers in program participation of Commercial Real Estate (CRE) sector mainly due to the split incentive between owners and tenants. There are three ways the Company will promote EE services to this sector:

- **Sustainable Office Design:** The Company will continue to market the "Sustainable Office Design" (SOD) initiative to address Class A type office spaces. The Sustainable Office Design (SOD) initiative promotes high-performance office lighting and controls for quick turnaround tenant fit-outs. This is an easy to use, performance-based design approach that benefits owners or tenants with energy savings depending upon the lease arrangements. A fixed incentive per square foot along with a pre-set design criteria and lighting designer incentives will provide easy participation for the tenant fit-out projects. In 2018, the Company will look for ways to engage and inform tenants and leasing agencies of this opportunity so that there is participation in this initiative.
- **Commercial Real Estate (CRE):** The Company launched a Commercial Real Estate pilot in 2017. The commercial real estate market offers a great opportunity for energy savings in National Grid's Rhode Island service territory. While Commercial Real Estate (CRE) is defined broadly to include retail stores, industrial parks and multifamily properties, office buildings were the primary targets of this initiative. Energy use is the single largest operating expense in commercial office buildings, representing one third of typical operating budgets. To encourage CRE customers to participate in National Grid's programs, the Pilot offers no-cost benchmarking services and technical support tailored to the CRE market. Benchmarking will be used as an introduction to energy efficiency for commercial building owners and managers who have not previously engaged with National Grid RI programs.
The pilot is designed to overcome the market barriers specific to this sector, which include:

- 1) Lack of budget for staff that focuses on energy management.

2) Lack of knowledge of how to incorporate energy efficiency improvements into capital planning.

3) Lack of awareness of energy efficiency program offerings.

Once the benchmarking is complete customers will be enrolled in the appropriate program be it custom retrofit, new construction, pay-for-performance or RCx.

A total of 30 buildings are being targeted with this initiative.

vi. Trade Ally Engagement (TRAEN)

Beginning in 2015, a Trade Ally Engagement (TRAEN) initiative was introduced to Rhode Island as part of an effort to reduce time in completing application forms for customers and contractors. This is a 48 hour pre-inspection service in which contractors call the vendor to schedule a pre-inspection of their commercial prescriptive electric lighting and variable speed drive (VSD) projects. The vendor handles the application process and hands off the project to National Grid after sending a pre-approval letter to the customer and contractor.

This initiative will continue to be used by the Channel Sales team as well as a few distributors during 2018.

c. Education and Training

National Grid is committed to promoting leadership in the community, various market sectors, trade organizations and associations by providing and sponsoring initiatives and outreach efforts for education and training.

The Company, as in previous program years, will continue to support opportunities to inform customers and trade allies/vendors/contractors, which serve various market sectors, about existing and new or emerging energy efficient technologies, building systems and design, building energy codes and standards, improved installation practices, and up-to-date operation and maintenance (O&M) procedures. By integrating local, regional, and national educational and training initiatives throughout National Grid's various C&I programs, the Company hopes to build awareness about the benefits of energy efficient technologies, market National Grid's energy efficiency programs, provide expertise and experience on the need for integrated design, and improve construction and installation practices for an existing or new construction building project. This includes support of the high performance schools energy summit,

as well as co-sponsorship of TEC-RI's training sessions. Information about National Grid's energy efficiency programs is also presented to members of several professional organizations including the Electrical League of Rhode Island and ASHRAE. Deeper energy savings, as well as other non-energy benefits, can be achieved for any given customer project when the customer, designer/engineer, or contractor/installer is able to express or share knowledge about an energy efficient technology, the associated costs, and energy savings potential.

i. Building Operator Certification Training (BOC)

BOC Levels I & II include HVAC, lighting and building controls. Students gain knowledge of their own building by completing projects involving documentation of building equipment, systems and controls, benchmarking the building's performance by using ENERGY STAR® Portfolio Manager™, updating occupancy profiles, reviewing HVAC systems and operation, and mapping the facility's electrical distribution system. In addition, the course addresses maintenance of building systems, equipment troubleshooting, preventive maintenance, advanced electrical diagnostics, and also HVAC optimization.

In 2018, the Company plans to support Building Operator Certification (BOC) training by holding at least three Level I BOC classes in Rhode Island and Massachusetts. The classes are planned to be held in Providence and Worcester. Classes will be held in the spring and the fall. The audience consists of facility managers, operating engineers, building technicians, and maintenance mechanics. The course provides a core foundation across the various building systems and maintenance practices of a typical commercial building – class instructors encourage class participation. In addition to the knowledge gained by listening to the instructors and completing both in classroom as well as out of classroom projects, the participants benefit from networking and learning from each other's experiences with building maintenance and energy efficiency. At each new course, an overview of the Company's commercial energy efficiency programs is given. Student satisfaction with the BOC training is high in that they would recommend it to others and their companies are likely to engage utility energy efficiency incentives for energy projects.

ii. Code Compliance Enhancement Initiative (CCEI) Training

CCEI includes in-person classroom and hands-on trainings, webinar presentations, project-specific technical assistance circuit riding, and dissemination of documentation/compliance tools like residential field guide, residential and commercial FAQs, technical bulletins, and case studies. CCEI focuses on ground-up new construction for residential and commercial buildings but also addresses additions, renovations, and retrofits. More details on this training are provided in the Large Commercial and Industrial Energy Efficiency Section under Building Energy Code and Appliance Standards.

CCEI includes:

- In-person classroom and hands-on trainings
- Webinar presentations
- Project-specific technical assistance circuit riding
- Dissemination of documentation/compliance tools like
 - residential field guide
 - residential and commercial FAQs
 - technical bulletins
 - case studies

iii. Advanced Workforce & Channel Development (Demonstration)

Online Trade Ally Training on Advanced Lighting Systems

Online Trade Ally targeted training that consolidates the best-of-class subject-matter expertise into one common platform with an electronic learning training program built to track the progress of participants. This online, on-demand learning platform will complement face-to-face and webinar based education, and is a proven way to meet the time demands of all trade allies. This online learning platform will provide efficient and effective education on Advanced Lighting Systems including controls and design. A well trained trade ally network will increase customer satisfaction while also increasing energy savings.

Utility Benefits	Trade Ally Benefits
<ul style="list-style-type: none"> • Automates onboarding tasks • Deploys program changes faster • Pushes fresh content to engage allies • Provides metrics for ally tiering programs • Shares in industry-provided content • Uses portal customized with utility branding • Increased energy savings from knowledgeable trade allies 	<ul style="list-style-type: none"> • Offers training access organization-wide • Educates all staff to increase project sales • Affords on-demand training when needed • Offers accredited CEU and certifications • Aligns real-time trainings with program changes • Recognizes achievement with rewards • Reports real-time metrics to track progress

d. Affordability and Financing

Over the past few years, the Company along with the State and Council, have made progress researching, planning and developing opportunities for finance mechanisms that will help customers overcome cost barriers and promote affordability for investments in energy efficiency. This section outlines ongoing efforts to study, plan, coordinate and offer financial products that meet customer needs and assist in delivering energy savings.

National Grid believes that financing plays a critical role in meeting efficiency and other goals; and that it is critical to think creatively about the future roles for incentives, the revolving loan fund (OBR), and other financing mechanisms; and the need to explore potential opportunities for leveraging public funds. Fortunately, as the focus on financing has increased, so has the number of market mechanisms available for funding efficiency projects. The Rhode Island Infrastructure Bank's Efficient Buildings Fund (EBF) and Commercial Property Assessed Clean Energy (C-PACE) programs, third party finance products, Pay as You Save (PAYs) programs, Metered Energy Efficiency Structure (MEETS), and others offer unique benefits and opportunities. Understanding these products, their ability to meet customers' financing needs, and how to harmonize them so that customers can understand and choose their best option is an important focus of the 2018-2020 Plan.

A firm foundation was laid in 2017. The Company engaged in multiple discussions with internal and external stakeholders including discussions with the Council, the EEMRC and a full day *technical session* with the PUC. External stakeholders include the OER, RIIB, the EERMC consulting team and their financial consultants from Dunskey Energy Consulting (Dunskey) and Rhode Island Housing. The Company also carried out research projects related to the historic and potential uses for OBR, and created a model to estimate funding requirements under various market scenarios. These frank discussions and related research led to the identification of three informal objectives that seemed to resonate with internal and external stakeholders that need to be tested and validated. They are: 1) increase comprehensiveness, 2) reduce incentives, and 3) Increase participation by improving access to cost-effective financing for all customers. The extent to which these objectives are attainable for a variety of customers, to be based on what criteria, and in what time duration must now be explored. In 2018, the Company will continue on that path, first by analyzing the lessons learned to date, and then by developing and implementing informed pilots to test hypotheses.

Lessons Learned

Lessons learned through past experience with financing mechanisms can help inform our path forward. The Company has and will continue to gain valuable experience by working with RIIB in support of the development, launch and resulting project implementation of the EBF. This program, available to the municipal sector, has provided an opportunity to assess the interplay between public financing, incentives and OBR. The emergence of C-PACE and third party finance products are providing insights about bundling efficiency, structural, maintenance and/or renewable projects as well as some of the transactional barriers customers face. Probing National Grid's Sales Leads' experience with customers has enhanced understanding of customer behavior and transactional barriers. Some conclusions include

- Customer Diversity – the Company recognizes that it's' customer base is diverse and that one financing product will not fit all. What has become more clear is that there is also great diversity within any given market segment, i.e. one university or manufacturer may have very different financing needs than another university or manufacturer. In addition, the type of project plays a role in determining the right financing tool(s), e.g. emergency response or long-term comprehensive multiple buildings vs quick turnaround. As a result, there needs to be greater flexibility in offering products that support various scenarios.

- **Customer Engagement** – Several years of offering OBR has crystallized the value of keeping financing transactions simple, off-balance sheet, quick, and flexible. These characteristics streamline what customers need to do for approval internally and improve success rates. Complex or unfamiliar financing transactions, such as placing liens on properties, can make engagement more difficult and reduce success rates. It seems worthwhile to try to incorporate features that are known to reduce transactional friction into evolving financing mechanisms to the extent possible.
- **Comprehensive Projects** – Comprehensive projects, those that involve multiple building systems and perhaps multiple buildings, require time, money and expertise to execute. For example, it can take months to bring customers to the point of saying yes to complex projects. Likewise, it may take months and supportive technical expertise to develop and bid appropriate scopes of work – information that is needed prior to moving forward with financing. And, by definition, comprehensive projects require larger amounts of capital. It is important to keep these challenges in mind as the Company seeks to optimize financing products that encourage comprehensive opportunities.
- **Integrated Offerings** – Financing products have different characteristics that make them more appropriate in some situations than others. Understanding these characteristics and how they fit together is a challenging yet important undertaking. It is equally important that messaging to the market remain consistent with that ideal, i.e. those who offer products are able to identify where they fit and know how to present them so that customers are adequately informed and free to choose. Developing common messaging, common goals, common reporting metrics, and transparency between product offers will become important considerations going forward.

a. 2018 Planning

As described in the 2018-2020 Plan, the Company will pursue the vision of providing an array of appropriate cost-effective financing options so customers can choose that which is most advantageous in each situation. The Three-Year Plan discusses the limitations of relying too heavily on incentive based financing and identifies strategies to improve current financing tools, determine where gaps exist, and develop pilot efforts to test out these ideas. The task is a large one, and discussions and group engagement have already begun.

The Company recognizes the need to dive deeply into enhancing financing mechanisms for all sectors. Residential finance opportunities are discussed in Attachment 1.

On the C&I side, the focus in 2018 will be on large C&I, i.e. customers with demand greater than 200kW. Small business financing explorations will follow in subsequent years, benefiting from the learnings with larger customers. Specific activities will support action items defined in the Three-Year Plan and might likely include some of the following focus areas:

- Collaboration – National Grid agrees with a statement in Dunskey's Three-Year Plan Review, *"National Grid's work with the EERMC, the Collaborative, and other stakeholders continues to be key to the success of energy efficiency activities in the state."* To that end, in 2018, National Grid will continue to engage with Dunskey on behalf of the EERMC, members of the EEMRC and the Collaborative, as well as other stakeholders. The intent is to socialize ideas and foster collaboration on appropriate activities. Initial meetings might be scheduled, where possible, before the end of 2017. Initial topics for discussion may include common reporting frameworks and potential OBR enhancements and pilot efforts.
- Common reporting frameworks – Developing a set of common reporting metrics that provide transparency in the allocation of funds, consistency in reporting of customer transactions throughout the process, funding allocations and spend, etc. will provide valuable information for assessing and planning future activities. In 2018, National Grid will pursue these goals with the State, the Council and RIIB. The objective is to create common sense guidelines that will enhance understanding and collaboration between organizations and help shape financial programs and offerings going forward.
- Understanding Product Offerings – Looking across the array of products already available and those under development can be confusing. Each one operates under a different structure (where the funds come from, how they are dispersed, etc.), requires different things from the customer (MOUs, Municipal Council Approval, follow-up data tracking, energy management plans, etc.), operates on a different cycle (e.g. semi-annual bond offerings), sets different financial limits, is available to limited segments of the market, and other varying characteristics/features. Gathering all this information into one place

would be very helpful in identifying the market segments, customer types, and/or project characteristics where each might be most successful.

- To this end, National Grid will work to develop an inventory of financing products and make it available to RIIB and other external parties. In addition, to help avoid confusion in the market, the Company will collaborate with RIIB and other Stakeholders to develop basic marketing messages – based on clear, concise, and consistent language – that can be used by all those promoting financial tools to customers and vendors. Engage Customers – As the Company comes to understand the various product offerings, it may be beneficial to hold one or more customer focus group meetings in one or more market segments. The purpose would be to learn directly about their financing needs, organizational constraints, reactions to available products, and perhaps to new ideas. This practice was very effective under the Rhode Island Public Energy Partnership (RIPEP) where focus groups were held for municipal, school, state, and wastewater personnel. The input underscored financing needs in the public sector and ultimately informed the EBF offering.
- Pilot Changes to OBR – Discussions in 2017 highlighted opportunities to enhance the OBR offering to support exploration of the informal objectives mentioned above – increase comprehensiveness, reduce incentives, and increase participation. To this end, National Grid is strategizing with the Sales teams to develop potential pilot efforts. Ideas discussed include but are not limited to the following:
 - Require comprehensiveness – develop requirements around number or types of measures and/or consider options for creating multi-year opportunities. Would require additional funds since comprehensive projects bring higher costs
 - Multi-year agreements – Some customers may prefer to space projects out over time, or may not have the interest or capability to handle multiple projects at one time. Setting up some type of agreement for future years would require certainty about future budget allocations (otherwise current year funds must be held over, a practice that is counter to current input from external stakeholders).

- Reducing costs – Develop a pilot to test the assumption that reducing incentives while increasing financing will reduce systems charges. It is unclear whether this objective is in some measure offset by promoting comprehensiveness and/or broader participation since those activities likely require additional financing.
- Third-Party Funding — National Grid recognizes the value of leveraging third-party capital. To that end, the Company will be developing opportunities for large C&I customers to access third-party financing mechanisms as well as, exploring how options can be seamlessly offered to customers and learning about barriers that third-party options can help overcome.
- Target customer segments – Explore saturation rates among customer with more than 500kW demand; opportunities with mid-size segments such as customers with demand between 200-500kW. This coupled with customer meetings and/or discussions with internal and external stakeholders might help determine where to target pilot efforts.

2018 will be a pivotal year for financing in Rhode Island. It will be critical to assess and develop finance options that push forward deeper dive efficiency improvements that will help meet ambitious energy savings targets in the future and, at the same time, leverage those in place. Several of the existing options are described in more depth below.

i. On Bill Repayment (OBR)

For large C&I customers the Company will continue to offer finance to help pay for customer costs through OBR from revolving loan funds. National Grid finances the customer portion of electric or gas efficiency projects, on bill, for up to five years at 0% interest. OBR offers easy access to finance as well as creates reduced customer transactional friction by easing the repayment process by offering the repayment of the loans on the electric bill. All customers are eligible for OBR.

The Company's evaluations and experience with changes in OBR lending strategy indicate higher customer demand for OBR than might be readily inferred from OBR's past spending history. In 2017, the Company is projecting approximately 150 customers and their branches requiring up to \$12 million to finance their projects. The Company also forecasts financing and/or committing OBR to customers at similar levels in 2018.

National Grid is not requesting a LC&I OBR fund infusion in 2018, however. There are two reasons. First, a fund transfer will be approved in 2017 by the Division of Public Utilities and Carriers and the EERMC to support continued OBR availability through 2018. Second, the legislated budget cap in 2018 made it difficult to invest in future customer finance options such as OBR at the risk of cutting services to customers.

To help ease budget limitations and better leverage OBR fund dollars, National Grid intends to decrease the planned year-end surplus in the LC&I OBR fund to an estimated \$1M- \$3M. The Company has, in previous years, maintained a larger surplus to ensure that OBR commitments to be paid in future years on comprehensive, multi-year, projects to large commercial customers would be met. These include significant annual commitments to large customers such as the State (in support of the Governor's mandate) and hospitals. In order to meet future customer needs and achieve ambitious energy savings targets, all finance options, including OBR, need certainty to both continue and perform at optimal levels. To create certainty that OBR will be a flexible finance tool in the future, the Settling Parties agree that fund injections in 2019 and 2020 will be such that National Grid can offer OBR at the level they deem necessary to meet the 2019 and 2020 goals, including multi-year commitments.

The Company began committing finance for large commercial gas efficiency projects in 2015. These funds are in various stages of the finance process and a fraction of the funds are available to repurpose and commit to customers each year. The gas revolving loan fund has increased to approximately \$1.3 million and the Company plans to maintain this level in 2018.

For small business customers, the Company continues from past years' successful experiences to offer on bill repayment for the customer portion of the project over 12 or 24 months. Due to changing ways in which energy savings are delivered to small business customers, the Company has more customers opting for the 24-60 month option, thus diminishing repayments in future year. However, the Company projects the fund will be able to sufficiently finance the planned 2018 small business customer demand. National Grid's revolving loan fund projections for 2018 are illustrated in Attachment 5, Table E-10 and Attachment 6, Table G-10.

ii. Rhode Island Infrastructure Bank – Efficient Buildings Fund

The Efficient Buildings Fund (EBF) is a long-term, low cost financing program for local governmental units, including quasi-state entities to invest in clean energy projects. EBF is administered in partnership between the Rhode Island Office of Energy Resources (OER) and Rhode Island Infrastructure Bank (the Infrastructure Bank). The EBF was created in 2015 with input from National Grid and a variety of stakeholders, many of which belong to the Rhode Island Energy Efficiency Collaborative. OER is responsible for determining project eligibility, reviewing project applications and producing a project priority list (PPL). The Infrastructure Bank only finances projects at sites that are listed on the PPL. OER, the Infrastructure Bank and the National Grid municipal sales representative work together to originate efficiency projects that meet the requirements of least cost procurement. EBF also provides financing for renewable energy projects and uses other forms of capital to support those transactions. The Infrastructure Bank does not receive an annual allocation of capital from the State of Rhode Island to support the program.

EBF closed round 1 of project financing in July 2016, funding approximately \$18 million of projects. This project funding for 2016 was supported with approximately \$1.8 million in energy efficiency rate payer funds from National Grid.

In 2017, the EBF held another application period for projects, receiving demand for over \$20 million in energy efficiency projects, with commitments to implement approximately \$15 million at below market interest rates for efficiency retrofits and renewable installations. In order to support energy efficiency projects in municipalities in 2017, National Grid transferred \$5 million into the loan fund, offered technical assistance and incentivized cost-effective retrofit solutions. The \$5 million from energy efficiency was only used to support finance for energy efficiency retrofits as under current regulations EE Program Charge funds may only be utilized to support energy efficiency projects. From the second and third rounds, RIIB projects that 4,000 in annual MWh energy savings and 90,535 annual gas therms will be enabled through EBF financing.

In 2018, \$5.0 million will be provided to EBF for an additional round of EBF financing. Based upon available resources and demand, the Infrastructure Bank expects to leverage the provided funds between two to five times. They project these 2018 financings will return energy savings of no less than 4,000 Annual MWh and 50,000 Annual therms. Additionally, to support the Infrastructure Bank's success, National Grid

may fund approximately \$100,000 in technical assistance studies and OER will assist municipalities with automatically updating their Portfolio Manager accounts for EBF building benchmarking and reporting requirements. National Grid will also incentivize the cost-effective efficiency projects for electric and gas retrofits with direct incentives to EBF customers.

Legislation was recently passed that clarifies the Infrastructure Bank's authority to finance projects for all local governmental entities, including quasi-state entities. OER, the Infrastructure Bank and National Grid have developed a pipeline of projects expected to be financed through EBF in 2018 and beyond, having developed more frequent application periods throughout the year. OER has also updated the EBF project regulations to allow for new construction projects to be financed through EBF. Additionally, OER, the Infrastructure Bank and National Grid's municipal sales lead have been meeting with Town Councils across Rhode Island to educate the Councils on the benefits of investing in clean energy projects. This additional education to the City and Town Councils across Rhode Island is an opportunity to showcase the EBF and benefits of investing in comprehensive energy efficiency projects.

In September 2017, the Rhode Island Department of Education (RIDE) released an assessment on the condition of Rhode Island's public school facilities. The condition assessment identified \$2.2 billion in investment needed to be made by Rhode Island school districts to bring the conditions of our public schools to current day standards. Many of the recommended improvements will involve energy efficiency investments and EBF will be a critical component to enable school districts to upgrade their facilities.

The new legislation and updated regulations, combined with the school facility condition assessment provide a significant forward looking demand opportunity for the EBF in 2018 and beyond.

Funds allocated to the EBF, including interest earnings, will be used in accordance with least cost procurement law, the EBF enabling act (Chapter 46-12.2), and regulations filed by the Office of Energy Resources and Rhode Island Infrastructure Bank governing the administration of the program. The Bank administers the EBF as a revolving loan fund, making loans from time to time for eligible projects, and tracks the funds awarded under the Plan independently of other sources of funds which provide additional capital for the EBF program.

Additionally, National Grid and the EBF administration team have agreed to deliver a common quarterly reporting framework for EBF based upon feedback from the Public Utilities Commission. Information is communicated in National Grid's quarterly reports. Information will include the status of funds managed at the Infrastructure Bank (funds lent, returned, committed and available). National Grid, RIIB and OER will continue to have regular communication channels to monitor savings performance of the EBF energy efficiency projects, consistent with National Grid's commitments to transparency and reporting.

iii. Commercial Property Assessed Clean Energy (C- PACE)

C-PACE is an innovative way for customers to obtain long- term low-cost financing for energy efficiency, clean energy and other building improvements in their privately owned businesses or non-profits. Importantly, C-PACE offerings are financed through private capital and do not necessitate an allocation of ratepayer dollars. Voluntary assessments for repaying municipal bonds have been attached to property taxes since the early 1800s to fund projects for public good such as sidewalks, fire stations, and street lighting. The C-PACE financing repayment is facilitated through the same municipal property tax assessment process. A voluntary assessment (similar to a sewer district assessment) is placed on the building owner's property tax bill. The assessment is repaid over the financing term (up to 25 years, project dependent). Given that longer term, and depending on the mix of energy efficiency and other projects, the annual energy cost savings can exceed the annual assessment payment, thereby enabling capital intensive equipment upgrades.

National Grid has been working closely with RIIB and its program administrator Sustainable Real Estate Solutions (SRS) and other stakeholders to launch a successful C-PACE program in Rhode Island. National Grid has participated in a series of meetings to educate RIIB and SRS in the basics of how the Company's programs operate and to assist the Infrastructure Bank and SRS in developing the initial program guidelines. The Company also led a day long charrette and series of meetings to talk about the how the C-PACE program could be integrated into the sales process of National Grid staff and its turnkey Project Expeditor (PEX) vendors.

Recently, the Company's work with SRS has included meetings to work through the process of making sure that –

1. National Grid sales staff understands the fundamentals of the C-PACE program and where it can be effectively used.
2. National Grid vendors understand the fundamentals of the C-PACE program and where it can be effectively used.
3. SRS and other RIIB vendors understand the fundamentals of National Grid energy efficiency programs and where EE projects will benefit C-PACE customers.
4. Mapping out the steps of exactly how the program will work with the many ways that customers may start their interaction with National Grid.

The Company believes that C-PACE and other publicly-funded financing mechanisms could fundamentally change the way customers think about efficiency upgrades, allowing them to bundle projects in ways they had not considered viable prior to this point in time. As such, the Company is pleased to commit to an ongoing collaboration with RIIB including common reporting requirements, continued financial and technical support as described above, and regular meetings and communication. The Company recognizes that this on-going coordination will help forge a strong partnership from which to promote comprehensiveness, address market barriers and enhance value for customers.

Third Party Finance Products

National Grid is committed to providing financing solutions designed to accelerate sales and remove project cost barriers. Financing energy efficiency upgrades can provide business customers with positive cash-flow in part because the value of the savings can be quantified and is often more than the cost of financing. However, customers may need assistance finding the capital required to help them invest in energy efficiency. In addition, the approval process and conditions attached to traditional bank financing are such that many customers are deterred from borrowing.

In 2017 National Grid in MA went through a competitive RFP process for third party finance solutions and partnered with Ascentium Capital, a national equipment financing company, to introduce a solution for large C&I customers. In the fall of 2017 this Ascentium solution will be offered to Rhode Island Commercial customers.

Instead of using the entire incentive from National Grid to buy down the capital cost of the project, this new offering enables customers to direct a portion of their incentive to buy down the interest on a loan to zero, they receive from Ascentium Capital; the

remainder is used to buy down the cost of the project and reduce the principal required. Ascentium provides a streamlined experience for customers, with quoting tools, applications, approvals, and documentation occurring online. Loans for commercial entities are available from \$10,000 up to \$1.5 million and in terms from one to five years; municipal financing is also available in higher values.

3. Commercial and Industrial Energy Efficiency Programs

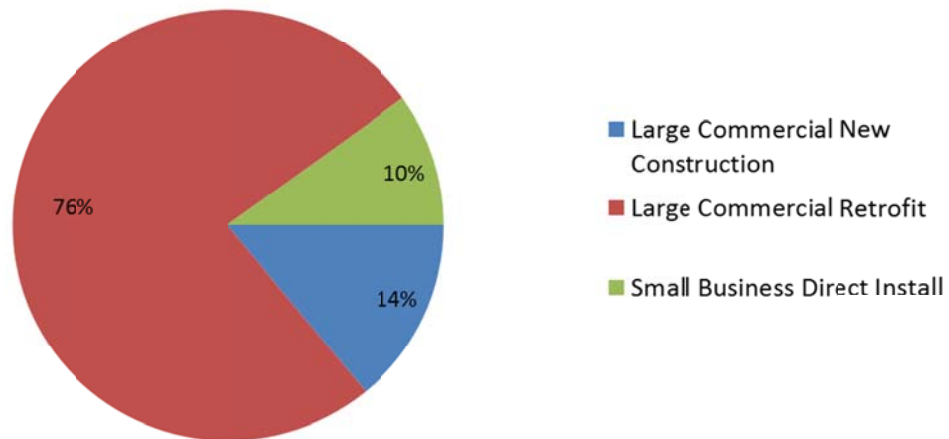
The C&I Energy Efficiency programs are organized in the same way as the built environment – customers are making decisions around their investment in higher performing new construction and existing buildings. Depending on the needs and size of the customer within each of the segments, customers can participate in one of three energy efficiency programs:

- The Large Commercial and Industrial New Construction Program
- The Large Commercial Retrofit Program
- The Small Business Direct Install (SMB/DI) Program

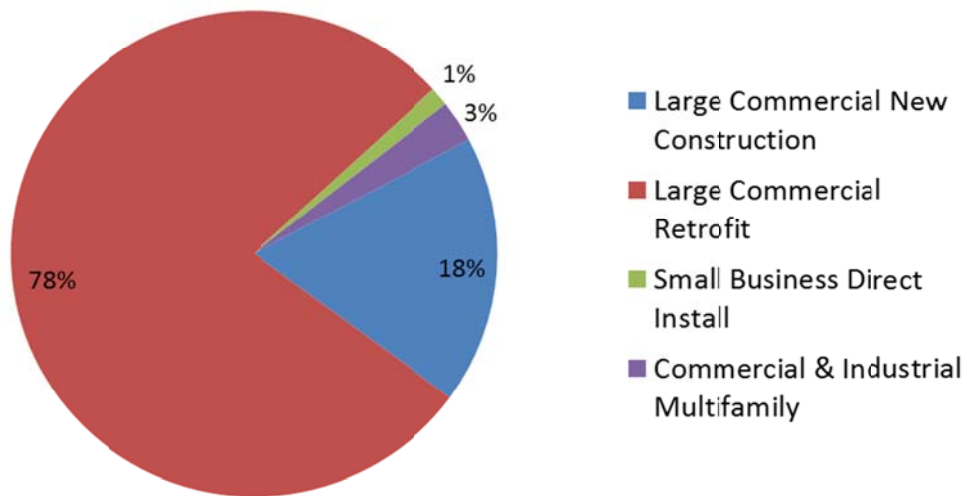
Although there are three programs in the C&I sector, all C&I customers are eligible to participate in the Large Commercial and Industrial New Construction Program and the Large Commercial Retrofit Program. However, the Small Business Direct Install (SMB/DI) Program is restricted to customers with 200 kW or less average monthly peak demand. Larger and more complicated measures not offered by the SMB/DI vendor go through the New Construction or Retrofit Programs. The following sections describe the various offerings under these three programs. In addition, a logic model describing the C&I programs and how they relate to short and long-term outcomes is provided in Appendix 2 and 3.

Commercial and Industrial Electric and Gas Goals by Program

2018 Annual MWh Savings Goals for C&I Electric Programs



2018 Annual MMBTU Goals for C&I Gas Programs



4. Large Commercial and Industrial New Construction Program

a. Overview

The new construction program is divided into two main categories:

1. **New buildings, major renovations and tenant fit-ups:** This is specifically for those projects that are ground up new construction or major renovations, all of which traditionally involve some level of design and are governed by code. The section below describes this in detail.
2. **End of life replacements:** Typically no design component, but governed by codes and standards in some cases because it has reached the end of its life. The baseline energy is considered to be the energy code and savings are calculated from the baseline code. This works the same way as the “systems approach” described below, whether through prescriptive or custom pathways.

b. 2018 Goals

For the 2018 Annual Plan, Large Commercial and Industrial New Construction has the following goals:

Electric

Demand Reduction (Annual kW)	Energy Savings (Annual MWh)	Customer Participation
1,728	13,959	139

Gas

Energy Savings (Annual MMBtu)	Customer Participation
42,764	105

c. New Buildings, Additions, Major Renovations and Tenant Fit-Ups

The services and incentives offered are designed to promote and support high performance building design, equipment selection, and building operation. This program offers both technical assistance and financial incentives based on projected energy savings performance to incentivize building beyond the current energy code baselines.

Technical assistance ranges from simple plan review and efficiency upgrade recommendations to complete technical reviews of energy models. In addition, the Company is utilizing existing energy efficiency technical assessment studies to provide engineering support to potential applicants for Advanced Gas Technologies (AGT) incentives.

The Large Commercial and Industrial New Construction Program offers two approaches for ground up new construction or major renovation projects:

- **Systems Approach:** The Systems Approach is designed for individual measures and for those projects applying later in the design process and which are generally focused on one or two energy systems to increase efficiency.
- **Whole Building Approach:** The Whole Building Approach takes into account a comprehensive analysis of all building measures together and requires collaboration between National Grid and the Design Team from the conceptual design phase through project completion. It encompasses consideration of all energy saving opportunities, including shell, fenestration, equipment and system interactions.

i. Systems Approach for New Construction

There are a few ways a customer can take advantage of the New Construction Program using the “Systems Approach.”

1.a. Prescriptive Path: The prescriptive path is the quickest and simplest way to participate in the New Construction Program. This is used for equipment that is commonly replacing less efficient equipment and for which savings data is available due to the length of time the measure has been in the marketplace and the number of installations is large enough for there to be a representative sample. A fixed dollar amount is paid to the customer for replacement of a specific piece of equipment.

1.b. Custom Express Path: The custom express path is used when a measure may be relatively new to market. It is a more streamlined approach than the custom path. Custom Express refers to a suite of calculation tools available for TA vendors and partners which utilizes pre-approved methodologies, industry standards and engineering best practices. A Custom Express tool is used to determine the project’s eligibility for an incentive on a case by case basis. This path can be used in conjunction with the New Construction Program but it is

more commonly used for Retrofit applications. The amount of the incentive for a measure going through the custom express path can vary from project to project based on projected savings.

1.c. Custom Path: For customers who wish to achieve deeper and broader savings compared to prescriptive offerings, a custom path is available. This involves a more complex engineering analysis and is frequently used by customers considering complex HVAC equipment and systems. Custom incentives for new construction projects are designed to cover up to 75% of the incremental cost between standard and premium efficiency equipment.

The sales team has the flexibility to offer incentives that can be negotiated with customers. The Sales staff determines how to negotiate, based on the customer's financial needs. This approach helps the Company to maintain cost control with program budgets.

In 2018, the Company will continue offering custom gas and electric measure options. (Please refer to the appendix at the end of this attachment for a sample of custom measures.)

iii. Whole Building Approach for New Construction

Under the “**Whole Building Approach**”, there are two main pathways for customers who choose to do comprehensive and integrated designs for their projects.

2.a. Integrated Design Approach is most applicable for buildings that are greater than 100,000 square feet or buildings smaller than this size that are not a good fit for the Design Express path. Both owners and design teams are eligible for incentives or projects that perform 15% better than the energy code. Customer incentives are based on kWh and Therm savings. Incentives are capped at 75% of the incremental cost of the energy saving measures. A fixed incentive is also offered to design teams for attending a design charrette/workshop that will enable them to incorporate energy efficiency early within the project stages. In addition, design team incentives are awarded for achieving energy savings that is 15% above the energy code savings target.

2.b. Integrated Design Express: This pathway is for smaller buildings in the 20,000 to 100,00 square feet range. Both owners and design teams are eligible for

incentives on projects that perform 15% better than the energy code. Customer incentives are based on kWh and Therm savings. Incentives are capped at 75% of the incremental cost of the energy saving measures. In addition, design team incentives are awarded for achieving energy savings that is 15% above the energy code savings target.

Operational Verification

To ensure energy savings projects are installed and operated as designed, the Company will continue to provide operational verification service in 2018 as in previous program years. This service will continue to be served by independent third-party vendors for verification of complex building systems, including HVAC projects involving energy management systems or other controls, ensuring proper installation and operation as designed. National Grid requires all projects which receive an incentive over \$100,000 to undergo operational verification. This service is also promoted for projects where the savings are dependent on control measures or operational improvements. National Grid typically provides these services at no cost.

d. Initiatives specific to New Construction Program

Specific initiatives are listed below within the New Construction Portfolio that address the unique needs of the New Construction market sector:

i. Building Energy Code and Appliance Standards

Overview

National Grid is one of a few utilities that have been allowed to claim energy savings for supporting progress related to the building energy code. The Company launched its Code Compliance Enhancement Initiative in 2013 and has been claiming savings for building energy code compliance support activities since 2014. The Company has also provided technical assistance for proposing new and improved appliance standards regulations for the State.

2018 Focus

Commercial Codes Savings:

Savings listed below are included in the 2018 Goals listed for Large Commercial and New Industrial Program

Electric: Energy Savings (Annual MWh)	Gas: Energy Savings (Annual MMBtu)
250	308

While the State's deferred update to a more efficient building energy code and an increase in compliance with its current code, reduces the potential savings for this initiative compared to previous years, the Company will refocus its efforts toward remaining compliance gaps. The Company will also investigate supporting building renovations/alterations that trigger the energy code, the State's adoption of an updated base energy code, the use of the State's newly developed stretch code and the possibility of claiming savings from these efforts.

As for appliance and equipment standards, the Company proposes to revisit its support of promulgation of advanced state-level standards as well as investigating supporting (and claiming savings from) the development of national standards.

Codes: The Codes and Standards initiative (C&S) is an innovative efficiency offering that saves energy on behalf of customers by creating: 1) an environment that achieves greater compliance with the state building energy codes, and 2) strengthens and promotes energy efficient appliance standards and accompanying consumer purchasing incentives. Two components of the codes work are described below:

Code Compliance Enhancement Initiative (CCEI) is a focal point of the C&S initiative. The CCEI will be entering its fifth full year in 2018 and will continue to build upon the successes of previous years. The CCEI includes robust stakeholder engagement and industry group outreach, in-person classroom and hands-on trainings, project-specific technical assistance circuit riding, and dissemination of documentation/compliance tools like residential field guide, residential and commercial FAQs, technical bulletins, and case studies. Since 2014 a total of 130 classrooms and on site trainings have been delivered through this initiative.

There are, and will continue to be, associated energy savings attributable to the Company for its efforts in helping to improve Rhode Island's energy code compliance rates. A 2016 compliance evaluation study for commercial projects found that compliance rates increased from about 70% with the state's previous 2009 IECC-based energy code to about 86% compliance with the current 2012 IECC-based version. An analogous 2017 study for residential projects showed similar results. Results of both studies have been leveraged to:

- (1) analyze the impact of CCEI trainings to improve compliance;
- (2) update the savings calculation method based on new compliance numbers; and
- (3) inspire new ideas to further improve compliance.

The Company will continue to deliver commercial and residential energy code trainings throughout 2018. While the content of trainings previously focused on transitioning from 2009 to 2012 IECC, trainings in 2018 will focus on remaining code compliance gaps while supporting Rhode Island's anticipated transition to 2015/2018 IECC. The Company will offer a reduced number of the longer residential and commercial trainings that it has employed in past years of the initiative, but in 2018 it will shift to shorter trainings focused on more specific content in order to directly address compliance gaps.

The Company will also deliver in-field/on-site demonstration trainings as a means to complement classroom trainings and will visually relate topics discussed directly to real-world situations. Webinars will be conducted on specific residential and commercial sub-topics covered in the classroom sessions.

Technical assistance pertaining to energy codes and related matters will be provided via energy code circuit riders. In 2015 and 2016 CCEI handled 50 residential and 14 commercial circuit rider calls, and 18 residential and one commercial circuit rider site visits. In 2018 again, circuit riders will be available to answer questions either by phone or in-person. Greater emphasis will be made to market and promote the service in hopes of increasing the number of in-field/on-site visits. The visits will be useful in resolving confusion or misunderstandings that building design and construction professionals may have about energy codes, and to ultimately supporting their efforts to better understand and execute code compliant building designs. In addition, the circuit riders and the trainings will educate the attendees about the Company's incentive programs that go beyond the code, thereby cross promoting its programs.

As in 2017, this initiative will continue to refine documentation/compliance tools created between 2013-2016, such as energy code checklists, technical bulletins, FAQ's and recently developed reference guides. Pending the passage of enabling regulations, the Company will also continue to work with the RI Building Code Commission to accommodate third party energy code specialists as optional energy related building inspectors for applicable projects undergoing the permitting process.

Stretch Code development:

The Governor's December 2015 Executive Order "State Agencies to Lead by Example in Energy Efficiency and Clean Energy" required OER to coordinate with EERMC, National Grid, and the Green Building Advisory Council to establish a voluntary or "stretch building code" that is based on the International Green Construction Code or equivalent by 2017. In 2017, the Company assisted this group with finalizing the stretch code for commercial buildings as well as providing support on the energy related aspects of an analogous residential stretch code currently under development. The use of this code will result in long term energy savings that will assist state agencies in meeting their energy reduction and sustainability targets. In general, the Company's involvement in stretch code support will be as follows:

- Provide technical expertise on energy related requirements
- Conduct stretch code specific trainings along with the base code trainings (as detailed in section above)
- Align the Company's new construction program with stretch code specifications as much as possible and within the framework of the Company's policy around EE programs
- Advocate for increased use of the stretch code and work with the Company's customers to achieve the stretch code requirements.
- Work with the internal evaluation team to develop a mechanism to claim savings for stretch code projects.

Appliance Standards:

Historically, the goal of this initiative has been to accelerate the development and adoption of selected new appliances as State level standards (better energy performance than federal standards), thereby increasing the efficiency of appliances sold and used in the State of Rhode Island. Over the past two years, the Company has worked with associated stakeholders to identify a target list of potential appliances, but the required legislation to cement this effort was not passed by state legislatures. The Company will continue to advocate for proposed State appliance legislation in 2018 (informed by an updated package of appliance standards published by the Appliance Standards Awareness Project in their 2017 "States Go First") and provide technical support regarding such parameters as market potential, energy savings, and life-cycle cost analysis. The Company will also work with associated stakeholders to develop a methodology to claim savings for this effort.

Starting in 2018, the Company proposes to directly pursue opportunities to partner with efficiency program administrators in California and beyond in advocating for federal appliance standards. The Company plans to coordinate with the appropriate stakeholders in order to develop a methodology to claim savings for this effort, likely following a similar model to the one currently being discussed for use in Massachusetts.

ii. Exterior Performance Lighting and Controls

The goal of this initiative was to extend the Company's existing performance lighting offering (currently offered to new and retrofit projects) to exterior lighting applications. Through this initiative, the Company plans to encourage:

- a) An understanding of exterior lighting codes
- b) Code based lighting controls for exterior projects
- c) Code based exterior lighting design that promotes best practices while saving energy.
- d) Lighting designers to understand exterior lighting codes, and to design to exceed code through innovative designs and technologies

In 2017 this initiative was incorporated into the Performance Lighting program. See section 5g.

iii. Energy Efficiency Integration with Solar

In 2018, the Company will continue to work to align its energy efficiency programs with the solar offerings in Rhode Island in order to help customers achieve zero-energy buildings. The Company will also work with the Office of Energy Resources' lead on the state's zero-energy initiatives pursuant to the Zero Energy Building Pathway to 2035 – Whitepaper Report of the Rhode Island Zero Energy Building Task Force (2016). (https://www.nationalgridus.com/media/pronet/ri-ee-task-force/cm6459-ri-zne-white-paper-12_16.pdf)

e. Demonstration/R&D Projects specific to New Construction

i. Zero Energy Demonstration Projects

Zero Energy Buildings (ZEBs) have the potential to strongly support Rhode Island's greenhouse gas emissions reduction goals. ZEBs minimize their overall energy consumption through innovative designs and energy efficiency measures. Renewable

energy technologies are then used to generate the remaining annual energy needs of the building. ZEBs can be homes, businesses, or other facilities.

As the largest utility in Rhode Island, National Grid has an integral role to play in enabling and accelerating the adoption of ZEBs in the state. In 2015, National Grid developed a whitepaper with input from key stakeholders for achieving ZEB goals by 2035.³ Recommendations in the whitepaper included establishing policies and legislation that support ZEBs, launching a state-wide ZEB program across all building sectors, and enhancing utility energy efficiency programs to spur the ZEB market while addressing energy efficiency and renewable energy integration barriers. National Grid is committed to supporting the State and making progress on these recommendations. National Grid has committed to developing ZEB demonstrations in 2018-2020 that will enable a go-to-market strategy for ZEBs. In 2017, National Grid will be working with Rhode Island Housing and the Office of Energy Resources to develop a moderate income/income eligible zero energy home(s). This demonstration will provide important information to guide the development of a zero energy offering in 2018 or 2019. In addition, two more demonstrations are planned for 2018. One demonstration will be a market rate zero energy home that will be an all-electric smart home. Again, this process will inform the savings available from zero energy homes and will guide the development of a zero energy offering. In addition, two commercial demonstration projects have been planned for 2018-2019.

Support for ZEB growth in RI will require education and training for the building community, technical assistance, and improvements to codes and standards. Furthermore, benchmarking and building energy labeling will help building owners, sellers, renters, and buyers move the industry towards ZEBs by encouraging everyone to consider energy efficiency during building construction and transactions.

National Grid has committed resources to help automate benchmarking and labeling efforts for commercial facilities with Portfolio Manager (a free online tool from the EPA). Portfolio Manager allows owners and operators to track and compare energy usage in buildings or a portfolio of buildings over time. This data helps owners and operators identify under-performing buildings, set capital improvement priorities, verify efficiency improvements, and identify successful energy management practices.

³ *Zero Energy Building pathway to 2035*, Whitepaper Report of the Rhode Island Zero Energy Building Task Force, Prepared by National Grid, November 2016

To achieve the State's ZEB goals, solutions to drive both new construction and large-scale renovation markets towards ZEBs are needed. In both market segments, National Grid is supporting strategic electrification efforts with technologies like heat pumps. The Company will also identify geographical locations where ZEBs will have the most beneficial impact on the grid.

ii. Power over Ethernet (PoE) lighting system for new construction or major renovation

The Power over Ethernet (PoE) lighting system provides DC power and data to LED fixtures using Ethernet cable (Cat5) which is regulated by the IEEE 802.3 standard. Each PoE, LED lighting fixture has an individually addressable IP address. Adding addressable sensors to the network creates a smart LED hub. Each PoE intelligent LED hub can collect information on ambient lighting, temperature, humidity, and anonymous room-occupancy data which it then communicates back to a controller. This PoE system provides enhanced controllability beyond code and can continuously optimize the performance of all the building systems to decrease building energy use. It also provides energy use monitoring and enables demand response events. Customers can add additional value by optimizing space reservations, and reduce cleaning and maintenance based on real time space usage. This lighting technology will demonstrate emerging infrastructure and controls technology with energy management potential as well as other non-energy related benefits. By coordination with DOE and other organizations, the Company hopes to gain a better understanding of how to match PoE Lighting solutions with the right market sectors such as data centers, and also other sectors with potential such as schools, office spaces and specialty retail.

iii. Performance Based Procurement

The Company is looking at a new approach to new construction projects. Performance based procurement is a commercial new construction program enhancement that encourages building owners and developers to specify energy performance targets and include them in the project request for proposals. The design and construction teams are selected based on their ability to meet energy performance targets. Performance-based procurement holds teams contractually accountable throughout design and into occupancy, resulting in actual performance and verifiable energy savings.

Performance based procurement results in deep, fully realized energy savings beyond prescriptive code minimums. This increases value to the building owner and delivers

greater savings to the new construction sector, where advancing energy codes and standards make energy savings goal achievement more challenging.

Value to Customers:

- Technical assistance to establish project energy requirements and evaluate team submittals.
- Procurement language that integrates into existing RFP and contract documents.
- Easy-to-use processes from RFP through building operations.
- Connection to financial incentives, OBR and C-PACE, including incentives based on post-construction measured energy performance.
- Training and resources that allow owners to replicate this approach across a portfolio of buildings.

iv. Indoor Agriculture

A new opportunity is emerging in Rhode Island around indoor agriculture or cannabis production. The common indoor warehouse production facilities can use 6x – 8x as much energy per square foot as an office building. This presents outstanding opportunities for energy efficiency, primarily focused on lighting and HVAC with potential for both electric and gas measures. National Grid will investigate the opportunities for energy efficiency and develop the engineering capability and professional resources necessary to serve this industry. There is capability to be developed within National Grid and outside. As with all of the Company's TA engineering it is done by third party engineering firms and National Grid needs to develop them to serve this market. The demand in Rhode Island is relatively small at this point but should Rhode Island legalize recreational use of cannabis in addition to current accommodations for medical use, construction of new facilities will explode almost immediately and the Company will be prepared to serve this expanded market.

5. Large Commercial Retrofit Program

a. Overview

The Large Commercial Retrofit Program serves the needs of existing buildings in their pursuit to lower energy consumption. This program includes three distinct components (similar to the New Construction program) each aimed to address specific market barriers and to advance efficiency: Prescriptive incentives are intended to support trade allies in advancing energy efficiency sales and to provide signals to customers who are making direct purchases that will encourage them to adopt the more efficient and more cost effective option. Custom incentives provide services to investigate opportunities to increase efficiency and support the steps needed to implement the upgrades. Finally, upstream delivery provides a more efficient way for customers to receive reduced pricing at the point of sale for energy efficient equipment purchased.

b. 2018 Goals

For the 2018 Annual Plan, Large Commercial Retrofit has the following goals:

Electric

Demand Reduction (Annual kW)	Energy Savings (Annual MWh)	Customer Participation
11,910	75,616	2,193

Gas

Energy Savings (Annual MMBtu)	Customer Participation
186,780	158

c. Pathways to Meet Program Requirements

i. Prescriptive Path

Prescriptive incentives are available in this program for some of the more commonly installed pieces of energy efficient equipment that are replacing standard efficiency equipment. Manual application forms have been available on the Company's website for customers and contractors to use when applying for incentives. Beginning in January 2014, prescriptive gas incentives were offered online. In 2017 National Grid plans to roll out an electronic application for customers to apply for prescriptive electric incentives.

In 2018, the Company will continue to offer prescriptive gas and electric incentive options. Wi-Fi thermostats will be added to the program as a gas saving measure. For more details on measure descriptions refer to Attachment 2018 Technical Reference Manual.

Custom Express Path

Similar to the New Construction Program above, the Retrofit Program also offers a custom express path for select retrofit measures. Some examples of electric custom express measures under the Retrofit Program include:

- Transformers
- Lighting
- Refrigerated Case Covers
- ECM Motors

Examples of customer express natural gas saving measures under the Retrofit Program include:

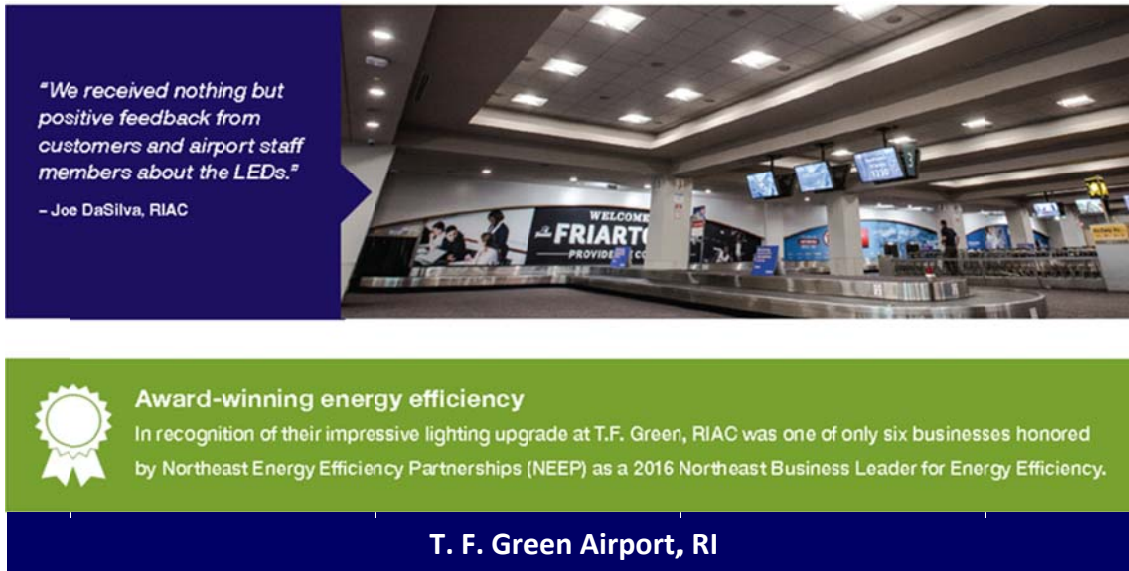
- EMS controls
- Energy Recovery Ventilator (ERVs)
- Heat Recovery Ventilators (HRVs)
- Steam Traps
- Pipe, Valve, and Tank Insulation
- RTU Optimization

ii. Custom Path

A customized approach that assesses the operations of the building through a technical assessment report (TA study) is usually the first step a customer experiences before applying for a custom incentive. Similar to the New Construction Program, the energy efficiency technical assessment studies for the Retrofit Program can also be used by customers to provide engineering support for the AGT Program.

These Large Commercial Retrofit Program incentives are designed to move customers to adopt more energy efficient operations, measures, and purchase and install premium efficiency measures. Incentives cover up to 50% of the total project cost including labor and equipment. The ability to negotiate custom incentive levels and TA costs for some of the largest customers will also be available for this program. See more details on this in the Large New Construction section above.

In 2018, the Company will continue to offer custom gas and electric incentives. Refer to the appendix at the end of this attachment for a sample of custom measures and new technologies. In addition, the following technologies will be tested through building projects: In 2018 the Company will focus on a system optimization approach by setting more aggressive, minimum thresholds for efficiency.



d. Initiatives Specific to Commercial Retrofit Program: Gas Technologies

i. Heat Exchanger Cleaning

During 2016, a demonstration project on heat exchanger cleaning was completed in Boston. In 2017, there is a plan to roll this out to Rhode Island customers, as the expectation is that this will be a good measure in terms of natural gas savings. This demonstration project is for shell and tube steam to hot water converters that are used for heating and hot water in hospitals, hotels and industry. The first demonstration project predicts 19,000 therms in annual savings for 10 similarly sized heat exchangers. Savings will vary based on the number of heat exchangers cleaned, size of system and hot water loads.

Results of the first demonstration project were excellent. Savings estimates were exceeded and project results passed the screening. The Company is currently performing a second demonstration project at a large university on 19 shell and tube steam to hot water heat exchangers. The Measurement & Verification Plan includes an

in-line vortex style steam meter and water flow meter. The baseline metering is getting underway at the time of this writing. A third demonstration project at a large university in Providence, RI is starting to provide upgrades and cleaning of steam to hot water heat exchangers for improved efficiency of steam systems.

ii. Xeros Polymer Laundry Solutions

There is a new technology on the market for commercial laundry operations which uses 80% less water, 50% less energy (natural gas) and 50% less detergent than more traditional equipment. The market sector for this equipment crosses over the Company's traditional market sectors – it includes commercial laundry facilities, laundromats, universities, and hotels. In addition to the obvious energy saving benefits, there are other benefits associated with this technology including requiring a lower temperature to operate, ability to get out stains other cleaning cannot do, ability to complete a cycle in less time, and ability to clean some materials that were previously unable to be cleaned. In 2018, National Grid plans to target the on-premise laundry customer segment in Rhode Island with this measure. This sector includes hotels, resorts, hospitals, commercial laundries and laundromats.

iii. On-Premise Laundry (OPL)

There are some on-premise laundry solutions to reduce natural gas energy usage including ozone, condensing equipment and a retrofit for dryers. National Grid has experience offering incentives to customers installing this equipment. In 2018, webinars will be provided to further encourage customers to embrace these technologies. The Company has successfully incentivized new commercial washers and dryers in hotels in Massachusetts and would like to gain more traction in Rhode Island. There is an Energy Star rating for commercial OPL Washers but none for dryers; however the custom path can be used to calculate savings. This typically screens as an end of useful life measure by comparing the incremental cost of the energy efficient machine to the machine being replaced. In 2018, the Company will focus marketing and sales efforts on these types of businesses to make them aware that there are retrofit and end of useful life incentives available on commercial laundry equipment.

iv. Steam Trap Smart Tags

In conjunction with doing a steam trap survey, smart tags can be added to each steam trap being reviewed. The steam trap vendor hangs the tag on each trap and provides National Grid and the customer with a spreadsheet providing information on the status

of each steam trap including date of service. There will be a National Grid logo and an app that a new facilities manager can use to quickly get up-to-speed in learning about the condition of steam traps in their new building. Infrared images are also available. This will also provide the new facilities manager with instantaneous information about National Grid's energy efficiency programs. No incentive is available at this time but may be considered in the future. These tags have been provided to National Grid's steam trap vendors to use on work done in the Company's energy efficiency programs. As of this writing, Phase 1 of the implementation is ongoing. The steam trap smart tags are being placed on existing and newly replaced or repaired traps on surveys performed in 2017.

v. EcoThermal Grease Filters

This is an emerging technology that incorporates an air to water heat exchanger into grease filters which fit into commercial kitchen exhaust hoods. In addition to exceeding UL grease collection requirements by 3.5 times, they also serve to pre-heat hot water. This also saves natural gas and electricity and the system captures and reuses waste heat that would otherwise be wasted to the outside. In 2016, the manufacturer partnered with the Company's vendors to perform demonstration projects in Rhode Island, Massachusetts and New York. As a result of this demo project, customers can expect energy savings and reduced cleaning costs to exceed \$4,000 per year. The average restaurant can save 2,000-3,500 therms per year in gas as a result of the pre-heating of hot water. This results in an average CO₂ reduction of 18.6 metric tons per site.

EcoThermal Filter'sTM website mentions that National Grid incentives are available for Rhode Island commercial customers. Filters fit into standard commercial kitchen hoods, making installation easy. Regular maintenance can be done by the restaurant's team and a deeper cleaning requires filters to be disconnected. Some restaurants hire a hood cleaning company for this work.

Sales efforts of this product have stalled due to the manufacturer pulling sales back to its headquarters in Michigan. This measure can succeed again if a local installer and sales force can be found in Rhode Island. The Company is inquiring with the manufacturer about their plans. National Grid is developing a relationship with new players to this market in New England and will provide trainings and presentations to the RI Hospitality Association Members to highlight this measure as well as other viable gas measures.

vi. Removable Insulated Jackets for Big Steam Plants

For some of National Grid's largest customers, steam turbine insulation jackets improve both efficiency as well as safety in the plant. They are easily removed and replaced by any staff member. Both standard and custom sized jackets are available. One single turbine can save \$9,500 in energy in a year. A heat loss reduction of 135 BTUs per square foot per hour can result from using the jackets. Touch temperature can be reduced from 750⁰ F to 145⁰ F, improving safety. This product also has a five year guarantee. This is a custom express gas measure that can save customers tens of thousands of therms annually. The measure will be aggressively implemented by the Company's energy efficiency sales teams in RI to all medium to large C&I customers who use steam and high temperature hot water for processes and space heating. It can also be used on all valves, fittings, steam traps, condensate tanks and uninsulated hot water tanks. The jacket has excellent synergies with general mechanical insulation on piping systems, steam system assessments and steam trap surveys. National Grid is providing training for these measures with targeted webinars on gas measures and Steam System Assessments.

e. New Gas Measures Being Developed

i. Tub Spout Water Saving Trickle Device

Similar to the ShowerStart device. ShowerStart allows you to save hot water and energy that's used while waiting for a shower to become warm. This device will be approved for small business, multifamily and C&I programs.

ii. Heat Watch

The Company is also facilitating "**Heat Watch**" for Multifamily, small business and C&I programs. This service includes running boilers in conjunction with controlling and managing the whole boiler and heating systems for a facility. National Grid is currently working on a custom savings tool and new measure development approval processes. This service will save 5-8% of energy on steam systems by preventing overheating and improving temperature control of spaces, especially during spring and fall.

f. Initiatives specific to Retrofit Program

Specific initiatives are listed below within the retrofit portfolio that address specific and unique needs of the existing buildings upgrades:

i. Retro-Commissioning

Retro-Commissioning (RCx) is defined as “the process of applying rigorous testing, verification and upgrade protocol to an existing building control system to identify and correct operational inefficiencies”⁴. RCx can be coupled with a monitoring system which uses metering and software to provide ongoing energy performance feedback directly to building operators and or the Company.

RCx targets both electric and gas saving measures and helps commercial and industrial customers improve performance and reduce energy consumption of their facilities through the systematic evaluation of existing building systems and may include continuous commissioning. RCx recommendations from a study are usually no-cost and low-cost HVAC measures that can be implemented in the course of normal maintenance or enhancements to building automation systems, eliminating energy waste. In addition to energy benefits, RCx results in increased comfort for occupants, and provides building information to owners and operators that allow the building operators to meet occupant needs for specialized systems, safety, security, and improved long-term capital improvement plans.

National Grid launched a retro-commissioning initiative with four customers from the healthcare, hotel and education sectors in 2017. Certain screening criteria were used for the selection of customers. Criteria included whether or not customers had an EMS; whether or not they had controls; and if they frequently received complaints from occupants about being too hot or too cold. The intent was to look for customers that had the greatest need for this service and for National Grid to be able to learn from the experience. The selection criteria used, proved to be successful, as four out of the five candidates selected continued to proceed with the initiative. From the launch of this initiative the Company has learned about engagement and that sustained savings from retro-commissioning takes patience, sustained interest, and commitment from both customers and by implementers. As a result of the Company’s experience with retro-commissioning to date, the Company will look to expand this initiative in 2018 and stream line the existing process for customers such that they benefit from this service in a manner that is both timely and less costly. In 2018, the Company will also investigate and determine ways to develop the vendor services market and test various TA vendors as well as turnkey RCx service providers in the Rhode Island market.

⁴ *Retro-commissioning Best Practice Study*, Revised Draft for C&IMC Review, MA, May 22, 2014


ii. Boiler Tune-Up Initiative

In 2015 a natural gas boiler tune-up demonstration project began in Rhode Island. In 2016, this project became an initiative and modifications were made to the qualifying criteria which broadened the reach to more customers. In 2016-2017 a strategy to engage with boiler service provider companies was deployed to pilot this program but was not successful. Many of the boiler tune-up service providers have existing contracts with customers and were not willing to modify their contracts to accommodate this initiative. In 2018 a new go-to market strategy will be tested where the Company will identify customers with gas boilers that meet the initiative criteria and the National Grid sales team will approach customers to enroll in this boiler tune-up initiative.

iii. Strategic Energy Management Planning (SEMP)

The Strategic Energy Management Planning (SEMP) Initiative is available to National Grid's largest C&I customers who have the potential to go deeper with energy efficiency, have a level of in-house sophistication to make organizational changes to plan for multi-year energy planning, and are motivated by corporate and institutional sustainability goals. A Memorandum of Understanding (MOU) offers a way to document a commitment between the customer and the Company to work together to achieve mutually stated goals through specific actions that are tailored to the customer's facilities over a multi-year planning horizon. As such, an MOU (though non-binding in this case) can set the stage for achieving deeper and more comprehensive energy efficiency savings, and is more likely to succeed than a "one measure" or "one year" approach. Typically, MOUs include participation and a commitment by upper management, the establishment of specific, very aggressive energy efficiency saving targets, and measurement and verification strategies to document savings throughout the target facilities along with an incentive structure that meets the customer's financial criteria. This offering goes far beyond energy efficiency into sustainability and branding support for the customer.

The Company currently has three SEMP MOUs which will continue into 2018. One is a large university campus and the second is a hospital group comprising of RI's five largest hospitals. In the second quarter of 2016 the Company added an additional SEMP focused on State facilities (detailed above under Municipal and State Sector). The Company will continue to work with these customers to help achieve their MOU goals.



Brown University — MacMillan Hall

New capital projects at Brown participate in National Grid's Comprehensive Design Approach Demand Side Management program. Brown has been an early adopter of advanced technologies such as daylight dimming control and demand-controlled ventilation.

The Need —
Replacement of air-based cooling systems that were reaching the end of their useful life cycle.

The Solution —
Upgrading an existing, more efficient chilled water-based system on an adjacent building and expanding into MacMillan Hall.

The Result —

- Saving on annual energy costs.
- Reducing impact on the environment.
- Improving the efficiency of their facility.

In 2018 the Company will further develop the SEMP initiative to include three tiers of offerings to customers, including financial tiers and service offering tiers, such that customers receive products and services customized to meet their needs. The goal of these tiered offerings is to engage in more SEMP's in the coming years that are tailored to fit customers' needs. Tier 1 will be basic services that establish a governance structure and help the customer coordinate gross annual energy savings. Tier 2 will include the basic service available in Tier 1 plus Technical Assistance (TA) services, Tier 3 will include Tier 2 services plus provide project management services to the customer. National Grid will also pilot Non-EE Solutions within its SEMP initiative, with individual customers who are interested in demonstrating and or adopting renewables, storage, Electric Vehicles EV, and distributed energy resources and technologies. National Grid will also explore service agreements and business models that will allow the Company to offer other energy solutions as part of the SEMP initiative. The Company will look to engage in SEMP initiatives with cities, K-12 schools and industrial customers in addition to the sectors it currently serves (colleges, universities, state facilities, and large hospitals).

iv. Lighting Designer Incentives (LDI)

Most lighting projects involve replacing old lighting fixtures with new, energy efficiency fixtures. This yields savings but leaves more savings untouched due to the lack of redesign. The LDI incentive goes directly to the lighting design team to fund their design and modeling efforts to achieve lighting energy savings while maintaining quality lighting design. The goal of this incentive is to have an early and deep impact on lighting projects, ensuring that energy efficiency and lighting quality is considered from the beginning and supported until the end of a project. The lighting designer becomes an EE champion, fighting for the best EE lighting for incentives. These lighting design solutions will have greater persistence because they are designed by professionals who have balanced the human needs of the project with the performance requirements of the lighting system, creating quality lighting designs that are “right-sized” for the project to meet the lighting end use needs in an energy efficient manner. In 2018, the Company plans to streamline the Lighting Designer Incentive program requirements and will expand the qualifications of a lighting designer to include architects and engineers who have 5 years of demonstrated lighting design projects.

Upstream Path: This is described in more details in section 5.f.ix. below.

v. Solid State Street Lighting

Based on the feedback it received from Rhode Island cities and towns, the Company estimates total savings to be approximately 35,000-37,000 annual MWh for solid state street lighting in Rhode Island. As of this filing, 16 towns in Rhode Island have completed the purchase of street lights, representing 42% of the municipalities served by National Grid. Four of these towns have completed installation of LEDs, either with or without controls. Eleven additional towns are in the process of purchasing their street lights from National Grid.

Customer Owned Street Light Equipment

Prior to rolling out the customer-owned street lighting tariff in 2014 and the energy efficiency program to customers, the Company held numerous meetings with municipalities and OER to ensure that customers understood what was involved in the process of acquiring the assets and equipment going forward.

Beginning in 2016, the Company received the first requests for municipal customers in Rhode Island to purchase their own street lights from National Grid in anticipation of converting them to solid state street lighting and in some cases, attaching adjustable controls. In 2016, 6,698 annual MWhs were saved by the City of Providence, during the first phase of their street light installation. As of this writing in 2017, four communities have saved a total of 7,238 MWhs by purchasing their own street lights and converting them to LEDs. In 2018, the Company anticipates that interest will continue.

National Grid recommends that municipal customers purchase LED fixtures and controls that meet the criteria of the Design Lights Consortium or Energy Star to take advantage of the Company's energy efficiency incentives. Information regarding energy efficiency incentives is provided by National Grid and OER. Historically, National Grid has not provided lighting design for street lighting because this is a customer option based on safety and security needs as well as the aesthetic preference.

On May 25, 2017, the PUC approved the Company's request to revise Street and Area Lighting S-05 – Customer Owned Equipment S-05 tariff (Rate S-05) to expand eligibility to include any municipal city or town, any fire district, any municipal water utility board, Kent County Water Authority, Rhode Island Commerce Corporation, Quonset Development Corporation, Rhode Island Airport Corporation, Narragansett Bay Commission and the State of Rhode Island. This change went into effect on June 1, 2017. Rate S-05 had previously been restricted to only providing service to streetlights owned by municipalities after being purchased from National Grid, pursuant to R.I.G.L § 39-30-1. National Grid agreed to expand the availability of Rate S-05 to these other entities. The Company's request to revise Rate S-05 was supported by the Partnership for RI Streetlight Management (PRISM), the RI League of Cities and Towns and the Washington County Regional Planning Council.

Since the beginning of 2015, the Company has offered incentives to municipal customers of \$0.15 per kWh of first-year savings for qualifying LEDs and \$0.25 per kWh of first-year savings for qualifying controls associated with either the dimming or part-night run hours as set forth in the street lighting tariff. These incentive levels will continue in 2018. Since the tariff was amended, the incentive is now available for all of the entities listed in the tariff.

In addition to the funding provided by the systems benefit charge mentioned above, the OER continues to accept applications for street lighting grant funding from communities

and will continue to evaluate the needs of communities for LED street lighting in 2018. There is a \$300,000 cap on the funding to individual cities and towns from OER. RIIB funding will continue in 2018.

Beginning in 2016, Rhode Island communities began to benefit from the Rhode Island Infrastructure Bank's (RIIB) Efficient Buildings Fund. Interested cities and towns applied for this funding in spring 2016. This funding is expected to continue for calendar year 2018.

Company Owned Street Light Equipment

In January 2017, provisions in the Company's tariffs for company-owned street and area lighting making available an LED option for customers went into effect. When a customer leases its street lights from National Grid and requests the exchange of an existing luminaire for an LED fixture, the energy efficiency incentive paid to that customer will be the same amount (\$0.15 per kWh of first-year savings) as is offered for qualifying LEDs in the customer-owned option. This incentive offering was presented to and agreed upon by the Collaborative in March 2016. Current company-owned street lighting tariffs bill energy consumption based on a dusk-to-dawn schedule. At this time, there is not an option for billing on other schedules such as part-night or dimming with the use of adjustable controls. Therefore, there is no energy efficiency incentive currently available for these adjustable controls. However, as the technology evolves and if it becomes a cost effective option for its customers, the Company would then consider the inclusion of adjustable controls or operating schedules in a future tariff filing and also include an incentive in a future energy efficiency program for company owned street lights.

Similar to a multifamily building or leased commercial space where the tenant pays the electric bill, as long as the landlord (in this case, National Grid) approves the replacement, the customer leasing the street light will receive the energy efficiency incentive directly.

The table below reflects some of the similarities and differences between the two ownership options available to customers for solid state street lighting.

Distinction	Customer-Owned	Company-Owned
LED Fixture	Customer owns the equipment and is responsible for the purchase, financing, and maintenance	National Grid owns, installs, and maintains the equipment. The customer requests the exchange of existing or installation of new lighting
Energy Efficiency Incentive	Customer receives a one-time incentive payment for the installation of LED equipment (after satisfactory post-inspection by National Grid)	Customer receives a one-time incentive payment for the installation of LED equipment (after satisfactory post-inspection by National Grid.)
Purchase/Lease	Customer purchases the equipment	National Grid leases the equipment to the customer
Outreach	League of Cities and Towns, Annual Department of Public Works (DPW) meeting with Company, and various other meetings	League of Cities and Towns, Annual DPW meeting with Company, and various other meetings
Technical Support	Customer is responsible	Customer is responsible

vi. Strategic Energy Management (SEM)

Strategic Energy Management is relatively new approach to achieving energy savings. It remains more of a concept with some common core features than a definable set of universally-accepted program elements. No matter how delivered, when SEM programs are evaluated, the common quantifiable sources of energy savings are: (a) identifiable O&M measures and (b) conventional ECMs that were identified through the SEM process, then incentivized and installed through a conventional custom or proscriptive program path, but with their savings attributed to SEM.

The central concept of a SEM initiative is to identify and capture energy savings from non-capital measures and create a culture within customer organizations in which all

members of the staff are empowered and encouraged to pursue energy efficiency – primarily definable Operations and Maintenance (“O&M”) and staff behavioral or operational changes. Ideally, SEM practices will be incorporated into the host company’s corporate culture. SEM is often presented as a market transformation initiative.

A SEM initiative appears to be the most effective when program administrators who wish to use it establish a continuing relationship with larger customers. For National Grid’s larger customers it already many of the services and savings components that often appear in a SEM program. These include, for example, customized Strategic Energy Management Plans and Memorandums of Agreement with large industrial and institutional customers that often contain multi-year energy commitments to planning, O&M initiatives, energy use tracking, and employee engagement. The Company also offers a Pay for Performance option to customers.

a. SEM Strategy

d. Market Analysis

It remains an open question as to what the potential for SEM is in Rhode Island, given ongoing SEMP relationships with many of the largest customers in the state. These SEMP agreements already contain some of the elements that would be included in a free-standing SEM initiative, and could easily be expanded to include others. However, other utilities are clearly gaining savings from SEM offerings, so the concept is worthy of further exploration.

Fortuitously, Massachusetts has agreed to test SEM in early 2018. Because launching an SEM initiative is labor intensive, National Grid proposes to actively monitor the Massachusetts test, and take full advantage of the process there in terms of RFP development, development of evaluation protocols, and processes for identifying and measuring savings attributable to SEM, etc.

Given the size of the Rhode Island market, the customer potential for SEM is much smaller than that it is in Massachusetts. Thus, it is only prudent for National Grid to conduct a local market potential analysis, and discuss potential interest in SEM and ISO 50001⁵, with customers who might qualify, given size and intensity of energy use. National Grid will conduct this analysis in Q2, 2018, in parallel with the unfolding of the Massachusetts test.

⁵.ISO 50001 is an energy management standard that provides a framework to achieve energy efficiency.

vii. Create pay-for-Performance (P4P) pathways within C&I offerings to incorporate O&M Measures

Program Administrators (PAs) in Massachusetts are developing appropriate incentives for O&M improvements within the context of the existing C&I program, via P4P, creating a pathway for participation across all customer sectors and sizes. In addition, PA staff in Massachusetts is examining a number of common measures with quantifiable savings with the aim of developing deemed savings and offering them prescriptively. The National Grid Rhode Island team will participate in both of these efforts and adopt the outcomes in Rhode Island.

This demonstration will attempt to identify other national best practices that can enhance, complement, or address opportunities unmet by them, where these are practical, cost-effective and locally applicable. The Company will monitor and participate in the demonstration that the Massachusetts Program Administrators have commissioned, and pose Rhode Island specific questions and comments throughout the process.

viii. Peak Load Reduction Strategies

The Company plans to pursue electric and gas savings with its customers that will result in peak load reductions in addition to annual kWh/therm energy savings. In addition to exploring peak demand strategies with its SEMP and industrial customers where there are large pockets of savings, the Company will continue to pursue the following strategies for summer and/or winter peak reductions:

- e. Wireless temperature controls: These controls provide the benefits of large commercial HVAC equipment, especially roof-top units for small businesses. The Company will continue to create messaging around the benefits of these controls for electric and gas and how it has a direct response to the expectation of higher energy costs in winter and summer. Selectable settings and the ability to send system information directly to a computer or mobile device enables users to remotely manage multiple rooms and properties thereby improving energy efficiency and occupant comfort.
- f. Marketing campaign for best practice tips: This campaign, which has been carried out since 2015 will continue in 2018 as well. This consists of a list of best practices for reducing electric and gas usage during winter and summer months, and could be distributed to all C&I customers during the winter of 2017 and summer of 2018.

- g. Pipe Insulation and steam trap surveys are already part of the Company's measure mix that is offered to its customers. As part of the winter campaign both of these measures will be marketed through the Company's sales and marketing teams to reinforce the importance of these measures on winter usage.
- h. Boiler Tune-Up: The boiler tune up initiative described above will further assist customers with winter peak reduction.
- i. Lighting and controls: Several initiatives and measures help reduce summer peak load through lighting specific measures.
- j. Demand controlled ventilation and energy recovery on HVAC units: Both measures provided in the programs that save on peak reductions.
- k. Demand Response: The Company is pursuing a demonstration project to test DR capabilities (described in section below).

ix. Products Offered Through "Upstream"

When the Company refers to an "Upstream" initiative it is referring to the practice of offering an incentive directly to a manufacturer or distributor (mainly distributors in Company initiatives) of efficient equipment instead of offering an incentive to the customer through an application form after the sales transaction has been made. This allows them to sell the product for less and make it more appealing to a potential customer. It also allows the customer to acquire this more efficient equipment without the burden of paperwork and waiting for reimbursement.

Upstream Lighting

National Grid's first, and flagship, Upstream initiative is formally known as "Bright Opportunities Rhode Island". This initiative was launched in February of 2012 with four types of LED and four types of fluorescent lamps. Today, the program includes a wide variety of LED lamps, small LED luminaires, and various sizes (1'x4', 2'x2', 2'x4') of recessed ambient LED luminaires or "troffers." To date, it has achieved more than 10,000 net annual MWh in savings and will continue to play a major role in the Company's programs in 2018 and into the future due to the fact that:

- Moving products from Downstream to Upstream removes customer-facing paperwork that the Company's customers have routinely indicated is a barrier to participation.
- Moving products from Downstream to Upstream has shown major increases in volume and energy savings in the past. This volume and increased

competition between many manufacturers and distributors drives the prices of luminaires down quickly and has given the Company opportunities to reduce incentives and make the initiative an even more cost efficient way to deliver lighting savings.

- Moving products from Downstream to Upstream, especially in concert with Mass Save Program Administrators (PAs), tends to change the stocking pattern of distributors across the region which facilitates the transition from fluorescent or HID sources to more efficient and more easily controlled LEDs.

Although the Company is constantly striving to deliver savings “deeper” than lighting, a rapid expansion to savings in lighting will have a positive effect (decreasing kW demand) in both winter and summer peak times due to the fact that commercial lighting is generally on during these times.

In 2017, National Grid eliminated all fluorescent offerings in Upstream lighting. The entire initiative will be focused on LED lamps and luminaires.

In 2017, National Grid is seeing a lower volume of the type of LED lamps that were first introduced in the initiative come through the system. The Company believes that this is due to the fact that a substantial portion of this market has been converted to LED lamps and that it might be nearing a saturation point. Therefore, the Company will spend more time and incentive dollars focusing on how to increase the volume of 1x4, 2x2, 2x4 luminaires, especially those which offer built-in controls which will result in more savings.

National Grid will continue to offer incentives on linear LED replacements for T8 fluorescents, as there are places where this technology is appropriate. However, the Company feels that many customers would be better served by a new luminaire, especially those with built-in controls. The Company continues to investigate other high efficiency lighting equipment and controls to potentially add to the program. In 2018 the Company will include T5 LEDs, u bend T8 LEDs, LED wall paks, LED high and low bay lighting.

Upstream HVAC

The success of the Upstream Lighting initiative encouraged National Grid to explore other areas where the Upstream model could be used successfully. After some research, the Company decided to issue a joint RFP with the Massachusetts Program

Administrators (under the “Mass Save” umbrella) for a company to run an initiative that will encourage distributors to change stocking patterns and advocate for energy efficient Upstream Unitary HVAC and Heat Pumps up to 25 tons.

This initiative has slowly increased savings delivered to the Programs since its inception. This initiative is less dynamic than the Upstream Lighting initiative, described above, as there are fewer manufacturers and less transparent pricing structures. As of Q3 of 2015, the Company and its partners EFI/CSG had enrolled all major manufacturers and have made inroads in understanding how this market works.

The contract with the previous vendor ended on December 31, 2016. A new vendor was selected and began January 1, 2017. There was a significant transition period for the first half of 2017 between the current and previous implementation vendors. More relevant program success data will be realized in the second half of 2017 and moving forward.

**It is important to note that savings from this particular set of products will be calculated from new construction baselines, not retrofit.*

In addition, the Company introduced two new Upstream HVAC products which are Electronically Commutated Motor (ECM) circulator pumps under 3 horsepower (HP) and Variable Refrigerant Flow (VRF) systems in Q3 of 2017. These new equipment types will be added to the existing equipment offered through the Upstream HVAC initiative through the same implementation vendor.

Optimize relationships with HVAC vendors to enhance the HVAC upstream program

In addition to the array of HVAC solutions the Company has supported for years, ranging from the air- and water-cooled air conditioning and heat pump equipment to boilers and furnaces and related controls and services, the Company will begin to augment these offerings in a variety of ways to increase savings from this important end use category.

For the upstream air conditioning and heat pump equipment offerings, the Company recently hired a vendor, who not only has the requisite back office and program administration capabilities, but also has very strong technical and commercial expertise, should improve and expand relationships with equipment distributors and lead to increased savings. Additionally, in 2018 more products will be added to the upstream

HVAC portfolio of offerings including Variable Refrigerant Flow (VRF) and Electronically Commutated Motor (ECM) pumps to better serve a broader array of customers' HVAC needs.

Through the Company's Channel Sales⁶ group, there are plans to work more closely and collaboratively with supply houses and wholesalers of HVAC equipment to enable them to more effectively both upsell and cross-sell energy efficient equipment. The objective is to convert more standard efficiency equipment purchases into high efficiency purchases and to increase sales of related or add-on equipment as well. Importantly, this approach will also remove the transaction costs burdens typically confronted by customers and or their contractors by having the distributors provide the information necessary to incentivize these projects. It is expected that this approach will increase savings with customers who have decided not to participate in the past, despite awareness of the available incentives and services. This approach could also lead to savings for customers who have historically been unaware of the available offerings.

Upstream Gas Equipment

In Q4 2015 National Grid and the MA Program Administrators launched the first product in the new Gas Upstream Program. By partnering with local water heating distributors, the Company collaboratively promoted the sale of high-efficiency water heating equipment. The Company leveraged the commercial water heater distribution network by upselling and stocking high efficiency equipment to influence as many qualifying commercial water heater sales as possible. As of August 2017, the initiative had 37 active distributors in both MA and RI representing 130 + branches. The success of this path has been quite remarkable. The initiative currently incents four different types of water heating equipment Indirect, Storage, Tankless, and Volume.

In 2017, the Company continued working closely with its partner Energy Solutions to increase unit throughput and distributor participation. Energy Solutions is responsible for signing up new distributors, training them on the initiative, providing return on investment sales training to sales staff, and overall promotion of the initiative out in the industry throughout the state.

⁶ The Company's Channel Sales Group manages relationships with external partners such as Project Expeditors (PEX), trade allies (contractors, installers, electricians, plumbers) as well as manufacturers and distributors of gas and electric products and services.

**It is important to note that savings from this particular product will be calculated from new construction baselines, not retrofit.*

Upstream Kitchen Equipment (Electric and Gas)

During 2017, the Company and the MA Program Administrators will be launching a Point of Sale (POS) initiative for all electric and gas kitchen equipment. It will be similar to current upstream offerings in structure for natural gas only convection ovens and fryers. The customer will receive an instant rebate at the point of sale, which, for the first year, will be equal to the current prescriptive incentive, and the equipment wholesaler will receive a small spiff for their efforts in getting the customer to upgrade to a more efficient product. This differs from the way the Company has pursued Upstream paths in the past in that it will leave the current downstream path open so that the customer has maximum flexibility. This has proven successful in other jurisdictions. A protocol has already been established to prevent savings being counted and dollars being spent in two places. National Grid expects to see a considerable lift in efficient kitchen equipment flowing through the system in Q4 of 2017 once all kitchen equipment measures are made available Upstream.

x. Combined Heat and Power Initiative

A combined heat and power (CHP) facility is “equipment used to produce electric energy and forms of useful thermal energy (such as heat or steam), used for industrial, commercial, heating, or cooling purposes, through the sequential use of energy.”⁷ Generally speaking, due to current installation costs, CHP systems are best suited to customer sites where there are significant and coincident thermal and electrical loads for a vast majority of the hours of the year. Notably, significant thermal loads during summer nights and/or swing season (spring, fall) periods aren’t especially common outside of manufacturing facilities, though lower CHP installation costs could help to expand the potential population of sites where CHP could be cost effective and offer reasonable payback periods for customers.

Since 2012, the CHP provisions of the Least Cost Procurement law in R.I.G.L. §39-1-27.7⁸ have required the Company to document the support for the installation and investment in clean and efficient CHP annually in its energy efficiency program plan by

⁷ CFR Title 18, Part 292, Sub-Part A, 292.101 – Definitions

⁸ See R.I.G.L. § 39-1-27.7(c) (6) (ii) through (iv); For the legislative history, see P.L. 2012, Ch. 363, §2792 Sub A (Enacted June 21, 2012).

including a plan for identifying and recruiting qualified CHP projects, incentive levels, contract terms and guidelines, and achievable megawatt targets.⁹

For 2018, the Company will continue to offer a Combined Heat and Power (CHP) incentive. In 2018, the Company's emphasis will be on increasing the support for qualifying efficient CHP projects through the energy efficiency programs, as intended by the legislation. Because of the high capital cost and technical requirements of installing CHP, there is a very long lead time for a successful installation. With small numbers of projects and wide ranges of possible project sizes, the Company anticipates substantial variability in MW realized in any given year. Noting this, for 2018, the Company is proposing a target of 1 MW of installed capacity that is expected to correspond to approximately 8,000 MWh of savings. For 2018, the Company has set a goal of three installations in Rhode Island and a commitment to initiate at least two additional projects in future years.

To qualify for a CHP energy efficiency incentive, a proposed project must meet the following conditions:

- Host customers must be in the franchise service area of the Company.
- Proposed systems must either be (i) thermal leading and sized so the recoverable heat can be used to offset other facility thermal loads and generate electricity as a by-product, or (ii) using waste energy or waste heat to generate electricity.
- Both new construction and retrofit installations are eligible; in either case, the baseline system must be carefully documented.
- The overall minimum total system efficiency of the proposed CHP units must be 55% or greater¹⁰. System efficiency is calculated as Annual Useful Energy/Annual Natural Gas Input where
 - Annual useful energy = Net Annual kWh*3,413/100,000 + utilized thermal output (therms)
 - Annual natural gas input = CHP gas input in therms (HHV)

⁹ See R.I.G.L. § 39-1-27.7(c) (6) (iii).

¹⁰ The RI DEM's Air Quality Regulations (http://www.dem.ri.gov/pubs/regs/regs/air/air43_12.pdf; Page 11) set a minimum system design efficiency of 55% for CHP to be eligible to apply for Emission Credits. As noted in the incentive levels section below, a higher energy efficiency incentive is available for systems with efficiencies of 60% or greater.

- The equipment to generate electricity may be an internal combustion engine, gas turbine engine, steam turbine, back pressure turbine, or fuel cell and the facility will capture waste heat for use in the facility.

Wasted energy systems and back pressure or extraction turbines can qualify. For these facilities to qualify the following conditions must be met; because these systems are designed to take advantage of existing on site wasted energy or inefficient processes, there is no minimum total system efficiency requirement.

- Host customers must be in the franchise service area of the Company,
- All thermal and electric output of the CHP facility should be used on site,
- While it is expected that most of these applications will be retrofit, both new construction and retrofit installations are eligible; in either case, baseline system must be carefully documented,
- The project must pass cost effectiveness screening.

The Company will undertake the following steps to support qualified CHP projects.

Identification and Recruitment of Qualified CHP Projects

The Company currently works with vendors and customers to identify CHP opportunities at customer locations. The Company promotes CHP systems and outlines the process for qualification and implementation of CHP facilities through the Company's energy efficiency programs. The Company has sales and technical staff who are the primary points of contact for customers and vendors with potential CHP projects. The Company will continue to communicate criteria for CHP assessment and will communicate to vendors so that their presentations to customers will be more consistent with Company technical assistance requirements.

Scoping Study/Qualification

The Company will offer technical assistance on CHP projects beginning with a preliminary scoping of a potential site. This scoping will be based on an evaluation of:

- Monthly (or hourly, where available) electric, gas, and other fuel usage
- All site-specific forms of thermal energy end uses
- Coincidence of electric and thermal loads
- Proposed project cost

This scoping will determine if further study of the site appears favorable, i.e., provides CHP operating hours and load factors that would be an appropriate application of CHP.

Technical Assistance Study

Assuming a favorable screening during preliminary scoping, National Grid will offer to co-fund a TA study of CHP with the customer. The TA study will be performed by an independent, qualified engineering firm. This study will assess thermal and electric loads, propose an appropriate CHP size and technology, compile a budget cost estimate, and identify potential barriers to the technology, etc. National Grid typically funds 50% of the cost of any TA study conducted by a preferred vendor selected by the Company, and up to 50% of the TA for other qualifying independent engineering firms. Any TA study by a CHP vendor or its representative which fulfills the CHP TA requirements may be accepted, though no co-funding will be provided. The TA study must be completed, submitted, and approved by the Company prior to implementation.

The TA study must include an assessment of the likely on-peak kW reduction from the CHP given the proposed nameplate rating, the net CHP output after subtracting parasitic loads associated with the CHP, projected availability based on anticipated site-specific operating characteristics, and performance data on other similar units. (On-peak kW reduction = Net Output x Availability x % Loaded.) This kW load reduction should be used in the benefit-cost screening.

As indicated in the incentive levels section below, a larger incentive is available for CHP projects that include the implementation of energy efficiency measures at the host facility. If the customer wants to meet a higher tiered incentive and did not previously qualify for that higher tier, the company could include another audit. This audit would propose measures to fulfill that requirement with new energy efficiency opportunities. These opportunities themselves will be eligible for energy efficiency incentives and will help make sure that the CHP facility is correctly sized for the facility's needs and will avoid creating a disincentive for future load reduction at the site.

Cost Effectiveness

The screening for cost effectiveness specific to CHP is included in the Total Resource Cost Test Description included as Attachment 4.

Incentive Levels

If a project has been shown to be cost effective, it will be eligible for an incentive. Incentives will be determined following cost effectiveness screening in consultation with National Grid personnel. The following rules will apply to all CHP projects (regardless of size) in the determination of the incentive. However, the amount of incentive the Company is willing to offer and commit to the customer could depend upon the amount of funds that are budgeted or remaining in the budget of the energy efficiency program.

- For cost effective CHP projects, the target energy efficiency installation incentive (“installation incentive”) in 2018 is \$900 per net kW, where net is nameplate kW output minus CHP auxiliary kW. For CHP projects with efficiencies of 60% or greater, the target installation incentive in 2018 is \$1,000 per net kW. Wasted energy, back pressure turbines, and extraction turbines are eligible for incentives of \$900/kW.
- For cost effective CHP projects where the host customer also commits to implementing energy efficiency measures representing at least 5% of site energy use or the maximum load reduction identified by a TA Study, whichever is less.¹¹ The maximum installation incentive in 2018 is up to \$1,125 per net kW, and the CHP sizing must incorporate the load reduction. For CHP projects with efficiencies of 60% or greater and that have similar energy efficiency participation, the maximum installation incentive in 2018 is up to \$1,250 per net kW. A customer may be treated as having made this commitment to energy efficiency if they have made investments to achieve similar load reductions through energy efficiency within the previous five years.
- All CHP projects are also eligible to receive other incentives, such as the Advanced Gas Technology (AGT) incentive, subject to the incentive package cap described below.
- CHP facilities greater than 1 net MW may be offered an additional performance incentive, as further provided in the section entitled “Special Considerations for Large CHP Systems,” below.
- The CHP system costs must include: all system, auxiliary, and interconnection costs, and CHP maintenance. If the CHP system is receiving a tax credit or

¹¹ If CHP facility sizing is determined by electric load (or not constrained by either electric or thermal load), the requirement will be 5% of electric usage; if the facility sizing is determined by thermal load, the requirement will be 5% of thermal energy usage. The energy efficiency measures will themselves be eligible for incentives, and are not part of the CHP incentive package cap described below.

other financial arrangement that reduces the cost of the CHP to the customer without distributing that cost reduction as an additional cost to other electric or gas ratepayers, it may be treated as a credit against the cost of the CHP project.

- The CHP incentive package cap from the Company will be 70% of the total project cost inclusive of the installation incentive, incentives related to gas service, present value of any performance incentive, system reliability procurement incentive, and any other incentives related to the transaction. For new construction installations, the incentive cap will be 70% of the incremental cost difference between the cost of what would have been done absent the CHP project and the cost of the CHP project.
- Retainage of 20% of the energy efficiency incentive payment will be held until commissioning is completed.

Other Contract Terms and Guidelines

In order to ensure proper operation of the CHP facility and persistence of energy savings, the following terms and guidelines will be required:

- Minimum requirements document. As part of the TA study, a minimum requirements document ("MRD") will be developed. This MRD will contain engineering hardware and operational specifications that directly affect the savings estimates developed in the TA study. Compliance with the MRD will be necessary to receive rebate payments.
- All systems will require electric, thermal and gas metering for commissioning and monitoring of system efficiencies. Metering hardware and data collection services may be provided at little or no cost to the customer.
- The project must be commissioned. Commissioning is a process following installation whereby a third party verifies that the project is installed and operating as detailed in the TA study and MRD.
- The customer must sign and produce a contract for O&M services through the first planned major overhaul of the CHP unit after post installation commissioning. On-going O&M contracts for a minimum of ten (10) years from project commissioning are recommended.
- The customer must apply for interconnection service as soon as practical and not operate the unit until they receive the authorization to interconnect from the Company. While there may be site-specific interconnection considerations for particular projects, please see the attached link for

information on interconnection:
http://www.nationalgridus.com/narragansett/business/energyeff/4_interconnect.asp
http://www.nationalgridus.com/narragansett/business/energyeff/4_interconnect.asp
http://www.nationalgridus.com/narragansett/business/energyeff/4_interconnect.asp.

- As noted in section 5.a.i. of the EE Program Plan, kW-demand savings achieved via the electric energy efficiency programs, including CHP, will continue to be reported by the Company to ISO-NE as Other Demand Resources (“ODR”) and the revenue generated will be used to fund future energy efficiency projects through the Company’s programs.

Delivery Service Tariffs Applicable to CHP Installations

Customers receiving an incentive payment for installation of CHP will be billed for delivery service charges on the appropriate general service tariff. The Company’s general service tariffs, Rates G-02, G-32 and G-62, include a CHP Minimum Demand Provision for those CHP installations that receive an energy efficiency incentive pursuant to this Plan. For Customers subject to this CHP Minimum Demand Provision, the monthly Demand will be the greater of a) the Demand as normally defined under the tariff provisions; or b) the Minimum Demand, which shall be 50% of the greatest fifteen-minute reading from the Customer’s generation meter(s) as measured in kilowatts during the month. The Customer Charge, Transmission Demand Charge, all per kWh charges and any other applicable charges and credits will be in addition to the Minimum Demand Charge. This rate treatment is designed to mitigate the cross-subsidies from other customers in the same rate class. The Company believes it is very important to ensure that a customer who is receiving incentives through the energy efficiency program continues to pay a fair share of the costs of the distribution system upon which the customer will continue to rely when the CHP unit is off-line.

Special Considerations for Large CHP Projects

A project that is greater than 1 MW of net nameplate capacity shall be defined as a “Large CHP Project” and may be eligible for special considerations that support the development of CHP, while accounting for its unique characteristics.

Qualification

The cost of the project will be reviewed by a design/build or general contractor experienced with CHP projects and revised as necessary.

Incentive and additional terms and conditions

If a Large CHP Project passes the benefit cost test described in Attachment 4, the appropriate incentive will be determined, based on the guidelines for all CHP projects set forth in the section entitled “Incentive Levels,” above.

An additional performance-based energy efficiency incentive, capped at \$20/kW-year (\$1.66/kW-month) for a period of up to ten years, will be offered as part of the incentive package for any project greater than 1 net MW. No payments will be made until the unit is in operation and provides demonstrated load reduction, and will be made semi-annually based on actual metered load reduction. Load reduction performance will be based on the net daily metered kW output of the system during ISO-New England’s on-peak periods averaged over each six month period.

Performance incentives will be subject to budget limitations and, in all cases, will be subject to the 70% total project cost cap applicable to all CHP projects set forth in the section entitled “Incentive Levels,” above. The total incentive package will include any incentives related to gas service, and the present value of the above-described performance incentive.

The customer will have to repay a portion of the incentive to the Company if the project is abandoned, removed from the premises, sold, or otherwise no longer utilized as the primary source of heat and electricity by the customer, within 10 years from the date of final incentive payment authorization. The repayment will be the energy efficiency installation incentive times the number of years remaining until the required ten years of service divided by ten. Other incentives, such as any Advanced Gas Technologies (AGT) incentives, may also have similar reclaim provisions.

Options for CHP proposal that fails cost effectiveness testing

If a CHP project does not pass the benefit-cost test, the Company will work with the customer to develop other solutions that may still support the CHP facility. Such other solutions may include one or all of the following:

- Re-analyzing the optimal size of the CHP unit, or the number of generators. A different sized CHP unit might provide better efficiencies and pass the benefit cost test.

- Identifying other load reduction opportunities at the facility. Benefits can be garnered from load reduction in lieu of achieving that load reduction through CHP.

Targeted Outreach and Support for Potential CHP Customers

The Company believes that significant savings can be generated with this technology in the coming years. The Company is focused on developing a pipeline of projects for small, medium and large customers. In addition to having a specific sales point person for CHP projects, the Company has a CHP program manager who helps customers navigate the technical and procedural aspects of bringing a CHP unit online. The Company also works with a TA vendor that provides assistance in identifying and executing CHP projects. In addition, the Company works with CHP vendors to offer RI customers smaller CHP units where installation and operations are turn-key. Furthermore, in 2016, the Company introduced a CHP manual to assist customers who are deciding if CHP is an option for their facilities. Other strategies that will enhance CHP acceptance will also be considered, such as: preparing and distributing case studies, providing plant operator training, and providing easier customer access to CHP unit performance data.

Installation of Incremental or Additional Energy Efficiency Measures for Customers who have Previously Installed CHP

The Company will individually review the installation of proposed incremental energy efficiency measures for customers who have previously installed CHP on site or who are adding additional energy efficiency equipment that might affect the performance of an existing CHP unit. The Company will carefully categorize and protect the benefits attributed to previously installed CHP projects, while at the same time foster any additional cost-effective EE measures that further reduce total energy use.

There are two types of project categories. The first category is “CHP Optimization” and involves measures which are installed with the purpose of increasing the output or operating efficiency of the existing CHP or other distributed generation (DG) unit; for example: the addition of combustion air precooling on a gas turbine CHP unit. In order to maintain compliance with ISO-NE’s FCM rules, such projects will be tracked in the FCM, if applicable, as incremental output of the associated DG facilities.¹² The second

¹² ISO-NE’s FCM rules require that new CHP facilities, or energy efficiency measures that result in the increased output of an existing CHP facility, are tracked in the FCM as distributed generation resources.

category is “Incremental EE”, which includes “traditional” EE measures installed with the intent of reducing energy consumption in sites that have previously installed CHP. These measures may or may not affect CHP performance and output.

For locations where an existing CHP unit covers a large percentage of the total load at the facility, additional energy efficiency savings measures installed may result in lowering the output of the CHP system instead of a load reduction on the Company’s electric grid. Therefore, to assess savings that can be claimed by the energy efficiency programs, hourly load mapping may be required to accurately assess the net savings on the Company’s electric and gas distribution systems, which will be assessed at the Company’s electric and/or gas revenue meters at the customer’s site. In cases where a typically electric measure (like lighting) reduces the electric load enough to require reducing the CHP output, gas savings may result from a normally electrical energy efficiency measure and could be claimed in the Gas utility DSM programs.

g. Retrofit Program Demonstration/R&D Projects

i. Demand Response

In 2017, the Company launched a demand response (DR) demonstration for residential, large commercial and industrial customers. The goal of the DR demonstration program is to reduce peak demand costs for all customers in the regions as well as reduce installed capacity tag¹³ for individual commercial and industrial customers through peak shaving and load shifting opportunities.

National Grid does not currently have specific distribution constraints on its system in Rhode Island that it is looking to address with this DR demonstration project. In early 2017, the Company enrolled over 5 MW of demand reduction for a summer demand response demonstration program with large C&I customers. The program offers customers monthly incentives for enrolled kW reduction as well as a performance incentive for DR event participation. National Grid will analyze data collected from the 2017 demonstration to assess the market potential, test delivery strategies, identify market barriers, and develop the cost effective screening framework for demand response (DR) programs.

¹³ Installed Capacity Tag is a capacity payment that is set for a customer by using their peak demand during the peak day/hour on the NEPOOL grid.

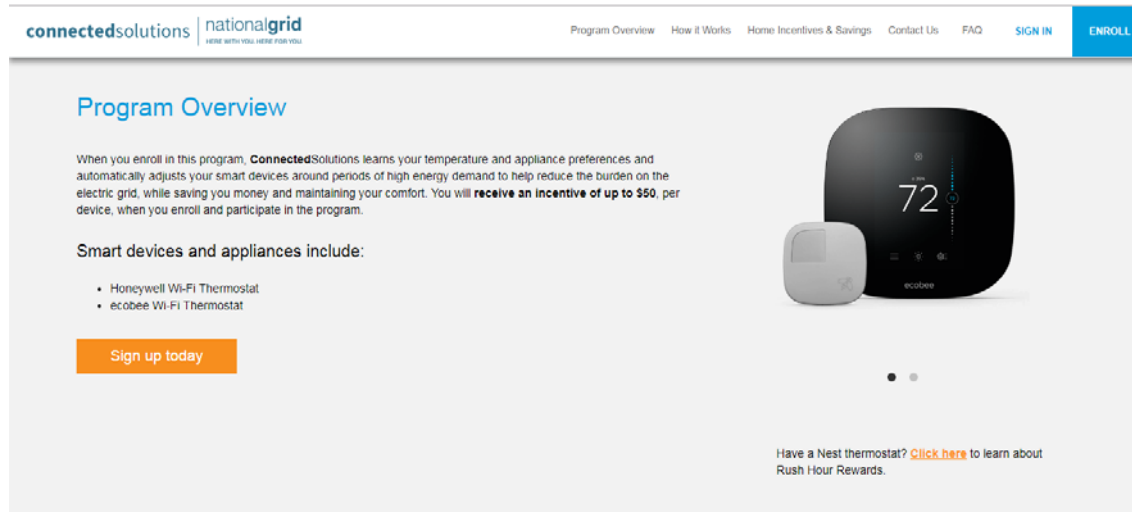
DR Events are triggered based on the day-ahead system load forecast for National Grid's RI territory. The targeted number of event hours is 20, with each event having a 4-hour maximum duration. Events are on weekdays, excluding national holidays, in the months of June, July, August, and September. The electric transmission and distribution systems in Rhode Island have a higher peak in the summer than the winter. Therefore, the summer peak is driving the size of the systems and there are more benefits to a summer demand reduction program than a winter reduction program. However, there would also be benefits to having a winter demand reduction program in the future, if it proves cost effective.

The Company currently offers an incentive, which is a combination of \$/kW and \$/kWh elements for the 2017/18 summer program season. This determined value represents a cost-effective level to attract participants and attain the goal of 10 MW of DR within its territory in 2018. Aggregators typically submit customer information to the Company on a first-come first-serve basis until the goal MW limit is reached. Aggregators must provide a realistic estimate of customer DR potential so as not to overinflate the values and fill the limit prematurely. Customers are required to have a utility interval meter in order to participate. ISO-NE FCM DR participants are eligible for this program. However, any DR asset receiving program incentives must be 'new' DR assets. Any DR asset currently bid into the FCM or any DR asset already under contract with an aggregator is not eligible.

Payments would be made after each summer season ends. Payments are based on average performance over all seasonal events and tests. No performance penalties are expected to be levied in the program. National Grid will utilize the ISO-NE Customer Baseline to measure performance based on interval meter data. ISO-NE Forward Capacity Market event/test days will be excluded from baseline calculations as reported by the aggregators to National Grid. Payments will be based on the aggregator's portfolio performance. Incentive funds will be given directly to the aggregator.

In 2018, the Company will also explore demand response program opportunities for small business customers with direct load control technologies. The Company will look to incentivize energy efficient connected technologies through the energy efficiency programs and will explore opportunities to reduce peak load by providing incentives for automatic load reduction during demand response events. Technologies include Wi-Fi thermostats that control air conditioners, smart heat pump water heaters, smart electric water heaters and network lighting. In addition, National Grid will explore other

demand response-enabled technologies as they become available in the market. The company will also explore opportunities in the connected space, with other non-energy Wi-Fi enabled technologies that may be an entry point or an engagement opportunity for energy efficiency and demand response with customers.



ii. Energy Efficiency upgrades in pumping systems for water/wastewater plants

This demonstration project will be an extension of a similar project currently in progress in MA. The objective is to evaluate energy efficiency and non-energy benefits related to pumping operations in water and wastewater plants in Rhode Island, also known as Pumping Systems Optimization. This Demo project will work with and persuade plant operators to investigate restoration of pump efficiency to design levels as well investigate incremental energy savings attributable from the application of wear resistant pump coatings to maintain persistence of energy savings over a longer period of time.

This demo project is intended to work with three prescreened sites to measure current operating efficiency on pumps systems equal to or greater than, 40 HP, compare to original design pump efficiency specifications, and to quantify energy efficiency improvement through rebuilding pumps to design specifications along with coating pump internal components with a wear resistance coating. The system assessment will include looking for additional energy efficiency opportunities such as pump/motor sizing based on measured values of pump flow, pressure and power, replacing throttle valves with VFD drives on pumps and any piping related issues. Pre and post system assessment will include measurement of power, flow and head will be completed to

quantify and confirm gains in energy efficiency by restoring the mechanical condition of the pump to original specifications supplemented by performance coatings to extend and maintain persistence of energy savings over a longer period of time.

iii. Behavior change through education of small/medium plant personnel

The main objective is to give smaller plants cost effective access to independent air systems specialists in order to facilitate comprehensive compressed air systems assessment. The Company will develop technology and training materials needed to facilitate this objective through web based training materials and tools combined with remote data collection process and support to interested customers. The intent of this effort is to drive customers to the Company's current compressed air offerings. Training is one component and the other is to install metering for flow, power and pressure and implement any efficiency improvements by working with the customer.

Benefits: Comprehensive systems assessments by independent compressed air system specialists are not easily affordable for small to medium size plants where total annual compressed energy usage is \$150,000 or less. This pilot will aim to educate plant personnel on the knowledge and tools required to conduct self-assessments, provide training and access to needed instrumentation and facilitate remote data collection and support to identify and implement energy efficiency measures. Completion of both phases of this pilot is expected to result in the development of a proven process to assist small and medium size plants with energy efficiency improvements related to compressed air systems.

iv. Emerging Lighting Market Interventions

Secure Lighting Spec (SLS) is based upon a mutual agreement with Lighting Manufacturer Representatives (LMR) to engineer and deliver lighting & controls packages that exceed energy code or Industry Standard Practice (ISP), which evr is higher, by 25% or more. The goals of the Secure Lighting Spec are:

- a. Establish a special partnership between National Grid and Lighting Manufactures Representatives (LMR) to participate in targeted code-based lighting incentive programs.
- b. Utilize the LMR application engineers to implement best practice lighting design and photometric modeling for deep energy savings and qualitative lighting outcomes for the Company's customers and building occupants, while meeting IES standards.

- c. Achieve substantial energy savings by utilizing the lighting engineering capabilities of the LMR. Savings are based on projects achieving 25% or greater energy savings beyond what is required by the energy code.
- d. Incorporate energy efficiency incentive estimates early in project quotes to clients & customers through the LMR pre-approved product portfolio.
- e. Reduce the lighting system initial costs through advanced lighting engineering, energy efficiency incentives and operating costs for customers and clients for projects that meet energy efficiency goals.

Lighting as a Service: Lighting as a Service (LaaS) is a new business model that delivers the best lighting equipment and ongoing commissioning for system optimization through a subscription based service. The goals of LaaS are: To create a leased equipment business model with zero capital expense that eliminates initial cost barriers for energy efficiency lighting projects. LaaS contracts will allow customers to reap all of the benefits of LED technology, without getting bogged down in the detail of owning and operating the lighting asset. Since LaaS offers a full turnkey solution, this type of service partner can supply the design, financing, installation, maintenance, monitoring and responsive performance adjustments (such as color tuning and dimming.) National Grid will look to partner with a LaaS provider for these services to customers.

Benefits of LaaS are:

- a. Enables real-time energy monitoring for evaluation to confirm savings.
- b. Works with demand response by identifying lighting that can be reduced during DR events.
- c. Works best with sophisticated lighting technology that can be optimized and maintained through the service contract. It works with all code-based lighting incentive programs, and is compatible with PoE systems with a higher density of sensors and data.
- d. Is an integrated program approach, i.e., a program that offers energy audits and energy efficiency solutions for a specific building type with prearranged financing and retrofit lighting system options.
- e. Involves a detailed analysis of facilities including controls sequence of operations, building set-points, occupancy schedules and operation and maintenance protocols. Once the analysis is complete, recommended optimization measures and an ongoing plan for maintenance and operator training is implemented. This will increase energy savings persistence and customer satisfaction.

One-Fit – Lighting Manufacturer Based Turn-Key lighting design

The One-Fit lighting solution would utilize lighting manufacturers to design all of the lighting for a project based on lighting modeling/calculations and include controls. A lighting manufacturer's application engineers will design the lighting for existing spaces and work with a distributor who will fill in any missing fixtures with other lighting products. Projects must include fixtures, retrofit kits and controls. This is a turn-key solution for the customer and installer. Qualified projects may also be eligible for OBR. The program will be based on Performance Lighting PLUS, thereby encouraging comprehensive lighting solutions with controls. Projects must be designed to meet the following criteria:

- a. Lighting to exceed code by at least 25%.
- b. Design must include controls that meet or exceed code
- c. Must meet IES recommendations for light level, distribution, spectrum, glare control, etc.
- d. LED lighting must be DLC QPL listed products, and lighting controls or equal
- e. Use the Performance Lighting PLUS incentive program
- f. Lighting system commissioning is required after 6 months to ensure optimal system operation

The One-Fit solution would cover a range of project types with a cap on hours of operation at 2,500 hrs (for schools). Manufacturers will be partnered with energy contractors (PEXs) for purchase and installation. This is a perfect fit for schools and municipal projects.

Lighting Re-Specification Incentive

Program Type: Retrofit & New Construction (Municipal Projects with Long Timelines)

Pilot Scope: Analysis, Research, Installation, Measurement & Verification

A pilot to allow long-term municipal projects that have already been specified, packaged and budgeted to change its specification to embrace current energy saving lighting technologies. Older specifications are often locked in on long-term projects based on the funding. At the same time LED lighting technology is advancing at a rapid rate increasing system efficacies, and lighting controls are now embedded into many LED fixtures. This pilot would provide incentives for the design team to perform a redo and pick newer lighting technologies that would achieve even greater energy savings than the previously specified lighting system. The pilot would use incentives to cover the

additional costs of a new lighting system (including controls) so that it matches the cost of the previously specified lighting system with greater energy savings. The anticipated costs of this program will not exceed \$0.25 per project kWh.

v. Emerging Lighting Technologies

Automated Window Shade Systems

Hypothesis: Will automated window shades provide increased electric energy savings in buildings with advanced lighting controls implementing daylight harvesting? Will automated window shades increase the thermal performance of the building envelop and provide gas savings in Therms?

For this pilot the Company is working with Ver-Tex a Boston based shade manufacturer representative, and SMMA to manage projects and establish the pilot parameters. Based on existing research, typical daylighting controls save 23% of the electric energy. With automated shades that total could increase to about 43%, almost doubling the savings. Additional savings can be obtained through using thermal insulating materials that can contain heat within a building while blocking the cold. The result is approximately 5 kWh of energy savings per sq.ft.

Web-Based Performance Lighting PLUS App

The pilot will include an online portal for National Grid's commercial clients as well as an incentive portal for National Grid's C&I Lighting program management staff targeting the Performance Lighting PLUS program for retrofit and new construction. The goal of this pilot is to increase participation in Performance Lighting PLUS by creating an easy webapp for project processing.

Client Portal

Client Portal will provide the following functions:

- a. Clients self-register where their utility account information is validated
- b. Enter building information based on pre-defined data requirements from the lighting program.
- c. Create project investment proposals that are validated with the product information in the DesignLights Consortium (DLC) Qualified Product List and allow users to add custom measures
- d. Calculate incentives automatically based on incentive rules and submitted applications

- e. Manage projects and facilitate communication with National Grid C&I program management staff

Incentive Portal

Incentive Portal will provide the following functions:

- a. Track and Manage incentive programs
- b. Oversee and report on pipeline projects (energy savings potential and proposed upgrades)
- c. Define incentive rules and data collection requirements
- d. Automate the validation of incentive applications
- e. Introduce real-time energy savings and incentive expenditure monitoring

6. Small Business Direct Install Program

a. Overview

The Small Business Direct Install Program (SMB/DI Program) provides turnkey services to commercial and industrial customers with an average monthly demand of less than or equal to 200kW. There is no upper limit of gas consumption that disqualifies a customer from receiving the gas measures offered by the SMB/DI program. The Company has delivered this program for more than two decades through a local vendor, who is known as the “Regional Program Administrator” or “RPA”. The RPA is responsible for program management, data entry, and quality control. The RPA is located in Rhode Island, and employs local staff, local electricians and energy efficiency lighting materials procured through a competitive bid process. As of 2011, customers served by natural gas are also eligible for direct installation of natural gas energy efficiency measures.

Mews Traven, Wakefield RI

Originally a small fishermen’s tavern which opened in 1947, owners Dave and Danny have transformed Mews Tavern into a legendary Rhode Island restaurant and bar. Mews took advantage of National Grid’s Small Business Program, after a free energy evaluation, they decided to move forward with recommended measures that helped decrease energy costs and their environmental impact.

The project achieved estimated Annual Energy cost savings of \$10,439 and Annual kWh Savings 77,750 kWh



Efficiency Improvements

Mews installed an Energy Management System and new energy efficient custom lighting.

Customers are provided turnkey services consisting of:

- An Energy Audit
- Direct Installation of Measures
- Company incentive contribution of up to 70% of the total project cost
- On-bill repayment (OBR) for eligible customer’s project costs and up to 24 months at zero (0) percent interest or a lump sum payment with a 15%

discount, resulting in most customers' projects having a positive cash flow when they choose the OBR repayment option.

Since its inception when the SMB/DI Program focused primarily on lighting and refrigeration direct install measures, it has broadened its scope to include identifying:

- Cost-effective "custom" electric and gas measures, such as Energy Management Systems (EMS).
- Time dependent opportunities such as replacing roof top HVAC units and heating systems.
- Participation in residential programs where buildings may have both commercial and residential properties in the same buildings.

As noted previously, the Company is continuously working with its engineers and technical assistance experts to try and move as many measures from the custom category to prescriptive or "custom express" to streamline the process for customers as much as possible. This should encourage the vendor and the customer to install these measures more frequently and reduce the technical costs of the program.

In addition to cost-effective custom and time dependent measures mentioned above, the SMB/DI Program offers incentives on the following measures:

- LED lamps and luminaires
- Occupancy sensors and controls
- Energy Management Systems (EMS)
- Thermostats (including Wi-Fi)
- Insulation
- Hot water reset
- Low flow pre-rinse spray valves
- Refrigeration measures such as evaporator fan controls, efficient evaporator fan motors, automatic door closers and door heater control devices for walk-in coolers
- Pipe Insulation

b. 2018 Goals

For the 2018 Annual Plan, Small Business Direct Install has the following goals:

Electric

Demand Reduction (Annual kW)	Energy Savings (Annual MWh)	Customer Participation
1,034	9,940	565

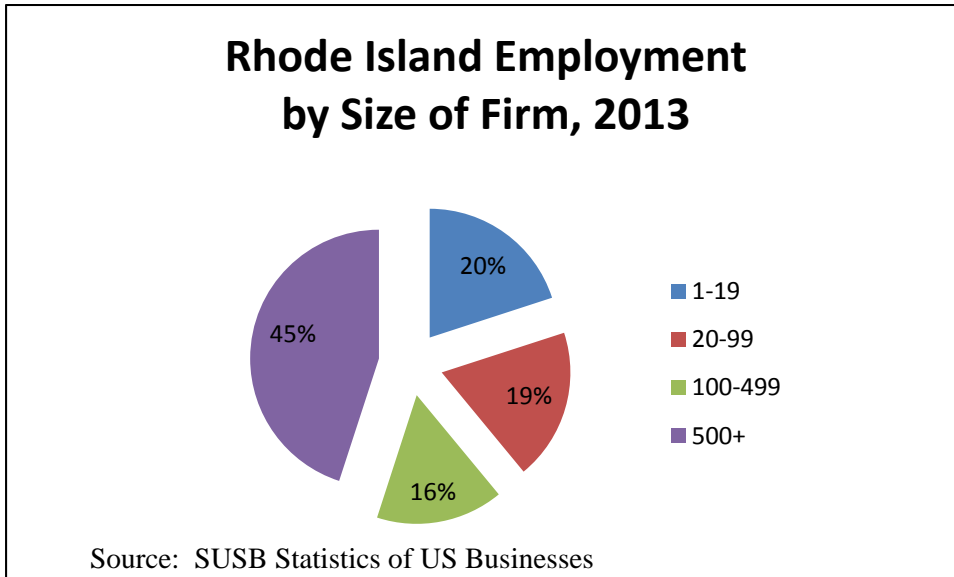
Gas

Energy Savings (Annual MMBtu)	Customer Participation
3,059	30

Offering Changes

As part of an effort to increase participation in the Direct Install Small Business Program, in 2018, for the first time, the Company will target businesses as well as residents as part of the Community Initiative. Many residents are also small business owners. By targeting residential customers to learn about the Small Business Direct Install Program, the Company has an opportunity to tap a segment of its customer base that may have been hard to reach in the past. Approximately 20% of Rhode Island employees work for companies with less than 20 employees and close to 40% work for companies with less than 100 employees.¹⁴

¹⁴ Statistics of US Businesses, US Census Bureau, www.census.gov/econ/susb.



Overall, the Company has a strong foundation of experience delivering this program, which enables it to meet program goals and to continue to develop and implement new products and services. As a result of the Company's increased move to vertical market sectors to serve customers better, the following segments are no longer included in the small business segment:

- K-12 Schools
- National Chain Retail Locations and Restaurants
- Small Grocery Stores (not including convenience)

The Company fully acknowledges that this will affect the ability of the SMB/DI vendor to reach goals on par with previous years and has adjusted their goals accordingly for 2018. The movement to vertical markets from the SMB/DI program will also impact the level of participation in 2018. The Company is planning to serve more SMB/DI customers in 2018 compared to 2017, particularly through the Upstream Lighting, Upstream Kitchen Equipment, and Upstream HVAC initiatives. These participants will be reflected in the other C&I programs. In addition, the refrigerator/freezer recycling program offered to residential customers where old working refrigerators and freezers are picked up for \$50 each, is now open to small business customers.

7. Business to Business Marketing

In 2017, the Company continued to build awareness of, and increase participation in, its energy saving offerings for Rhode Island's business customers. The Company did significant research to understand the mindset of its commercial and industrial customers including the completion of studies on its customers' familiarity with energy saving offers and their satisfaction. The Company leveraged the results of these studies along with media habits research and behavior data in the development of a strategic communications plan. Four key initiatives were identified as opportunity work streams that would help us achieve the goal of broadening customer engagement with energy efficiency:

1. **Market Tiers:** Increasing commercial customers' familiarity with the Company's energy saving offerings is a key component of ensuring all Rhode Island businesses have the opportunity to participate in these programs. A strategy was identified to help the Company achieve this goal in the fall of 2016. It was determined that in order to increase overall EE Familiarity the marketplace of commercial customers must be tiered, enabling an increase in outreach to customer segments that are less likely to be aware of National Grid's programs and offers. The Company's marketing and customer insights teams collaborated to identify market tiers by analyzing over three years of monthly EE Familiarity survey data. This effort led to a creative problem solving workshop where it was determined that very small businesses (less than twenty employees) without access to a facilities manager were least likely to be aware of the Company's programs. Marketing outreach was then allocated into tiers and increased impression volumes and communications frequency to this audience.
2. **Micro-Segments:** 2016 saw the successful launch of the Company's industry vertical targeting strategy which included hospitality, healthcare education, gas stations, auto dealers, and offices. One goal for 2017 was to build upon the success of that launch and micro-segments within the larger verticals. For example rather than reaching out to the entire healthcare vertical, communications were developed for smaller segments that included private practices, dentists, and nursing homes. Finer-tuned messaging and imagery was developed through use of imagery that reflected these micro-segments. Within the hospitality vertical geo-targeted placements were procured including a restaurant advertorial in *Restaurant Business* and a Convenience store advertorial in *Convenience Store News*. Past participants were also identified as a

micro-segment to target to offer new measures or measures that they had not previously taken advantage of in the small business program.

3. **Digital Path-to-Participation:** Meeting customer expectations through a streamlined digital experience will support a more successful path-to-participation. Native advertising was expanded. Native advertising means “in-feed” through video, infographics, and articles, as a way to more positively impact the research phase of the commercial customer journey. The Company is also utilizing these assets across digital properties to encourage more dynamic customer engagement. The Company has also tested new digital channels such as cross-device digital banners where it is able to target banners based on an individual’s behavior across multiple devices (desktop, tablets, mobile). In addition is Zip-Based Dynamic Digital, where a town name is dynamically updated based on the location of the customer, and Search Intent Digital wherein a user is delivered messaging based on recent searches, such as properties for rent.
4. **Activating Influencers:** Leveraging the power of customer voices and trade partnerships will provide third-party validation of the benefits of the Company’s programs and services. For Familiarity, Large business, Small Business and Multifamily programs developed a variety of Advertorials, Articles and sponsored content featured in places like Rhode Island Monthly.

The Company is tracking its progress against these initiatives and based on performance will look to expand or pull back in 2018. The Company’s main focus in 2018 will be to increase scores related to EE Familiarity. To track familiarity with the Company’s energy saving offerings among business customer, the Company conducts ongoing research through its “Brand, Image and Relationship” (BIR) tracker. Commercial customers are surveyed via phone and are asked: How familiar are you with energy savings or rebate programs from National Grid to help you with ways to use less gas or electricity? The survey is conducted seven days per week, and the Company contacts 10 commercial customers per week. The results are reported on a quarterly basis and the Company has specified metrics and scores that it is measuring against. Despite five straight months above the target and stretch goals, a slow start to the year in the EE Familiarity scores has resulted in the Company not meeting its calendar year to date goal. While the Company hopes that continued success in the remainder of 2017 will result in the Company reaching the target to developing new strategies in 2018 that will help the Company improve these numbers.

In addition to these initiatives, the Company's annual Customer & Partner Energy Efficiency Summit (EE Summit) has helped cement its relationships with its largest customers. The EE Summit has been held at Gillette Stadium in Foxboro, MA since 2014. The EE Summit exemplifies the Company's customer focused philosophy, providing solutions that break through its customers' pain points and roadblocks. The summit's goal is to make the energy solutions the Company offers more accessible and easier to implement for its customers. It's also an opportunity for the Company to build personal relationships with its customers, sales teams and vendors. The Summit includes vendor partners and acclaimed speakers on teamwork, problem solving, sustainability, and innovative energy approaches. The ongoing theme of *Appreciate, Collaborate & Innovate* has become a north star for the event, spurring ongoing improvements in the Company's customers' event experiences. The Company's 2017 EE Summit will be held on October 16, 2017. A date for the 2018 Summit has not yet been planned.

To enhance customer marketing, the Company's trade ally marketing aligns professionals who either influence or implement energy decisions for mutual customers who are potential participants in National Grid's energy savings programs and solutions. These professionals include distributors, architects, builders, construction managers, contractors (HVAC, mechanical, electrical) and installers (electricians, plumbers). Marketing for new construction targets design professionals such as architects, engineers, construction managers (i.e. design build firms) and real estate developers (i.e. REIT). For lighting professionals (i.e. designers, distributors, manufacturer representatives and installation contractors), the Company targets commercial office space rehab fit-outs (i.e. commercial leased space upgrades) to the design professional and lighting upgrades to the lighting supply chain (distributors and manufacturer representatives) and installation contractor audience. HVAC contractors and professionals are targeted for equipment replacement, upgrade and maintenance opportunity.

All of these trade and allied professionals have an advisory role to the ultimate customer depending on the scope and scale of the project. To best serve their specialized needs, position them as trusted advisers, and help them grow their business, the Company created the National Grid Professional Network. It is a unifying umbrella affiliation that supports easy access to information, programs, and incentives and education/training that help these professionals incorporate energy efficiency into new

construction or retrofit projects and create differentiated value that gives them a competitive edge.

National Grid's goals are to increase trade awareness, engagement and satisfaction with Rhode Island energy efficiency opportunities and to promote innovation to capture untapped savings for commercial, industrial, institutional and residential market segments. The types of projects include new construction and retrofit; but the Company also looks for ways to develop opportunities for system level savings and integration. Ultimately, National Grid's trade ally program promotes cost and operating efficiency for its electric and gas customers throughout Rhode Island.

8. Appendices

a. Appendix 1 Sample list of custom measures in the energy efficiency program

Building envelope measures

- Fenestration
- Insulation

Laundry systems

- Polymer bead systems
- Ozone systems

Commercial kitchen measures

- Large dishwashing systems
- Heat recovery for water heating from
 - Cooking surface exhaust
 - Large refrigeration

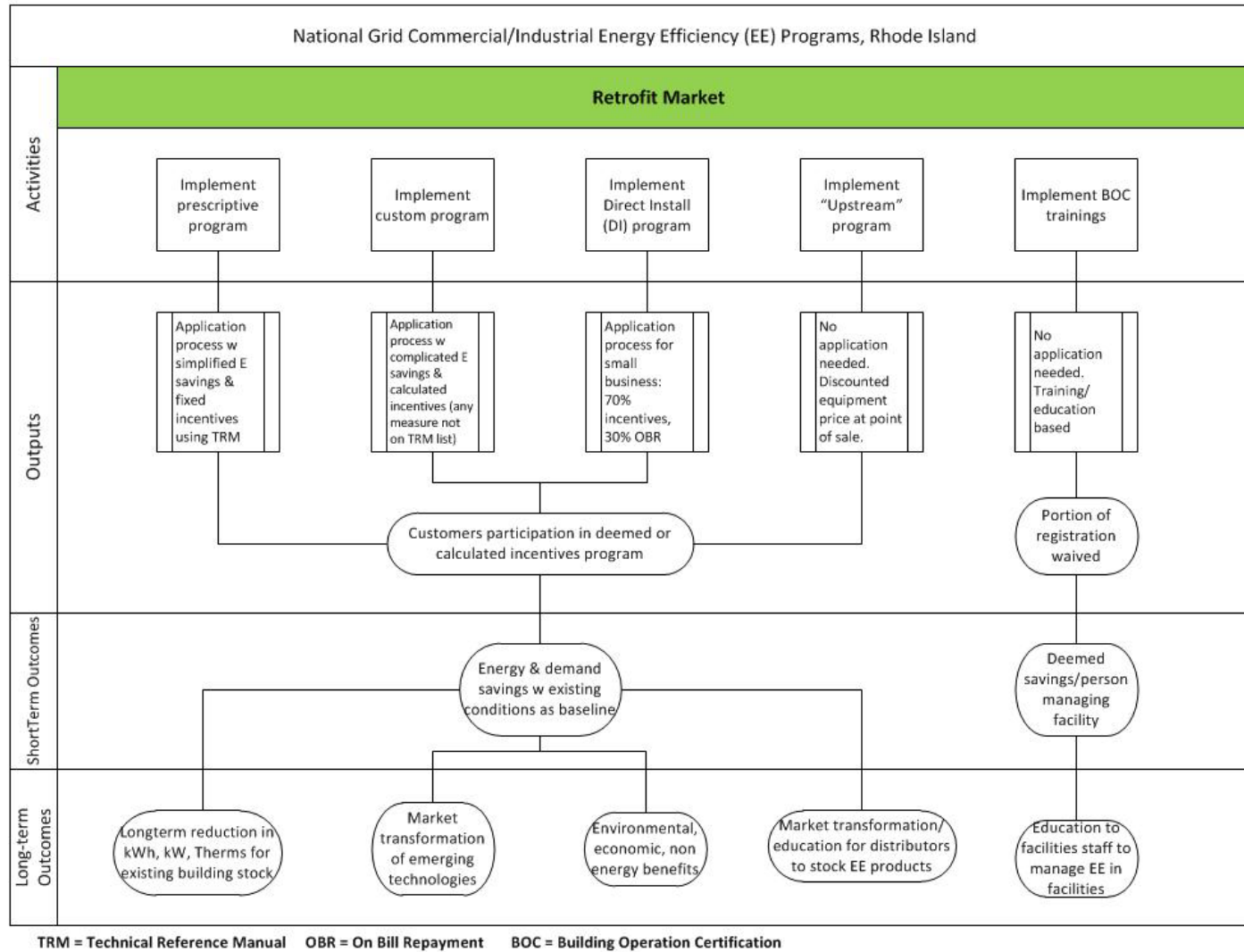
Manufacturing

- Process improvements
- Energy efficient production equipment
- Specialized lighting
- Compressed air

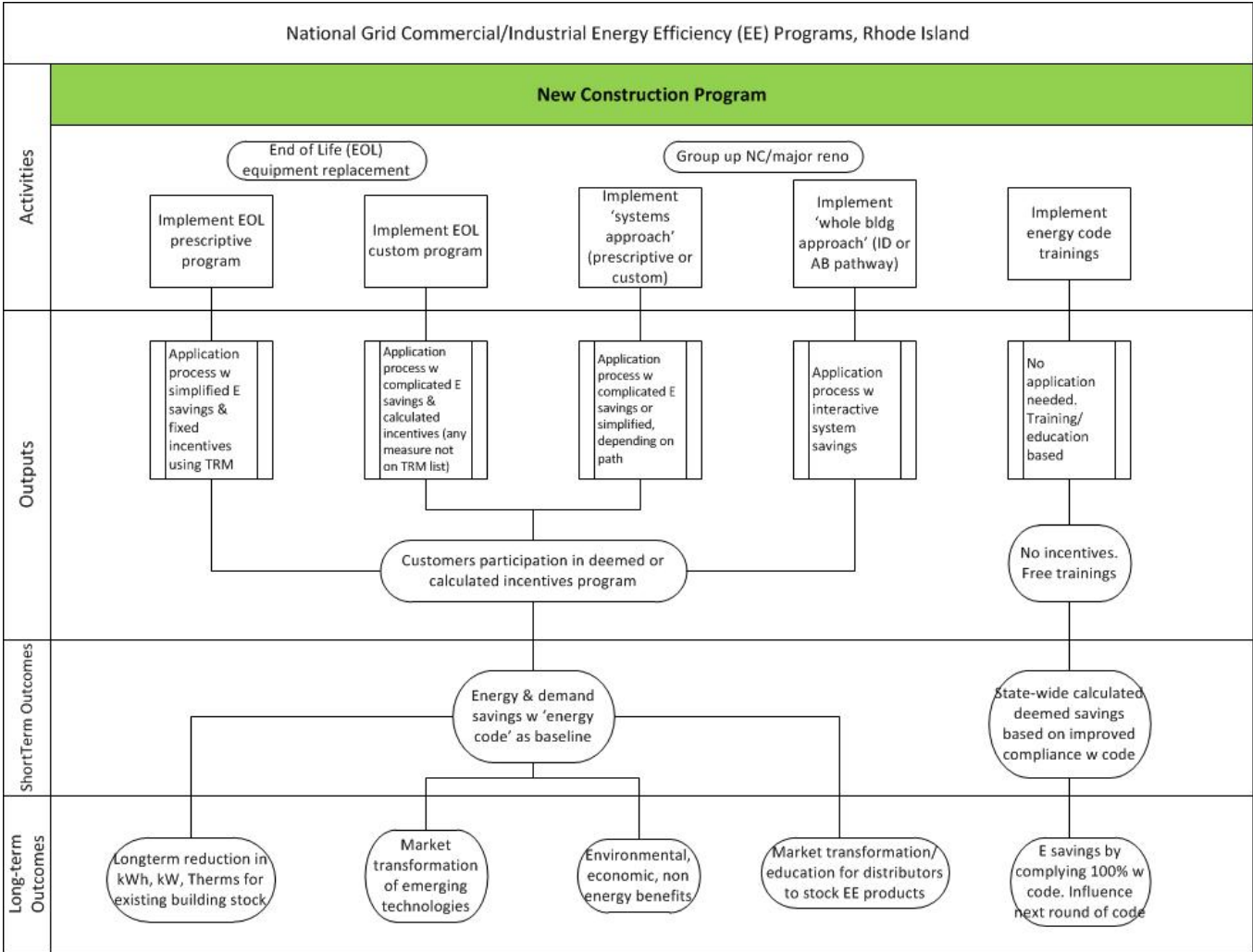
HVAC

- Variable refrigerant flow systems
- Energy recovery ventilation (ERV)
- Air source and water source gas engine driven heat pumps
- Smart HVAC monitoring and control systems
- Dry Smart gas dryers

c. Appendix 2: Retrofit Logic Model



d. Appendix 3: New Construction Logic Model



TRM = Technical Reference Manual ID = Integrated Design path AB = Advanced Buildings path

e. Appendix 4: Subprogram and Measure Savings Goals and Incentives

Electric Subprogram Net Savings Goals and Incentive Descriptions

Electric Programs			
Program	Subprogram	Annual kWh Goal	Incentive
Large Commercial New Construction	Compressed Air	960,700	Typically up to 75% of Incremental Cost
	Upstream HVAC	3,698,695	
	Custom	7,339,520	
	Lighting	1,223,341	
	Variable Speed Drive	486,262	
	C&I Codes	250,500	
Large Commercial Retrofit	Custom	25,322,055	Typically up to 50% of Project Cost
	HVAC	1,868,256	
	Lighting	8,823,318	
	Variable Speed Drive	2,814,360	
	Combined Heat Power	6,399,200	
	Upstream Lighting	24,073,560	
Small Business Direct Install	Street Lighting	6,315,000	70% of Project Cost 30% Financed
	Small Commercial Industrial	9,940,477	

Gas Program Measure Group Description with Quantity and Rebate Levels

Gas Programs			
Program	Measure	MMBtus	Rebate Level
Large Commercial New Construction	Boiler95	873	\$ 1,500
	CODES AND STANDARDS	5,000	\$ 63,000
	COMBO COND BOIL/WTR HTR 90+	309	\$ 1,500
	COND UNIT HEATER 151-400 MBH	128	\$ 750
	Condensing boiler <= 300 mbh	250	\$ 1,500
	Condensing boiler 1000-1700 mbh	619	\$ 7,500
	Condensing boiler 1701+ mbh	1,084	\$ 10,000
	Condensing boiler 300-499 mbh	513	\$ 2,000
	Condensing boiler 500-999 mbh	943	\$ 4,000
	COOKING-COMBO OVEN 1	208	\$ 1,000
	COOKING-CONVECTION OVEN 1	577	\$ 1,000
	COOKING-CONVEYOR OVEN 1	53	\$ 1,000
	COOKING-FRYER-1000	1,104	\$ 1,000
	COOKING-STEAMER-1000	134	\$ 1,000
	Furnace95ECM	68	\$ 500
	Furnace97ECM	25	\$ 800
	INFRARED HEATER - LOW INT	188	\$ 750
	WATER HEATER TANK 0.67 EF	347	\$ 152
	Water Heating Boiler - 85% TE	28	\$ 152
	Water Heating Boiler - 92% TE	69	\$ 152
	COMBO COND BOIL/WTR HTR 95+	4,673	\$ 152
	COND WATER HEATER 90%MIN 75-800	3,387	\$ 152
	Custom	32,936	Up to 75% of Total Resource Cost
Large Commercial Retrofi	BOILER RESET MULTI-STAGE	67	\$ 225
	Builder Operator Certification	1,336	\$ 518
	LF_SHWR_HD_1.75_GPM_DI	490	\$ 200
	Pre Rinse Spray Valve	513	\$ 25
	STEAM TRAPS	28,611	\$ 50
	THERMOSTAT	30	\$ 25
	WiFi Thermostat - cooling and htg	653	\$ 100
	WiFi Tstat-heat only	653	\$ 100
	Custom Retrofit	155,585	Up to 50% of Total Resource Cost

Gas Programs			
Program	Measure	MMBtus	Rebate Level
Small Business Direct Install	BOILER RESET 1 STAGE	137	\$ 420
	FAUCET_AERATOR_0.5_DI	329	\$ 11
	INS_DUCT_SF	3	\$ 8
	INSUL_PIPE_DI_1.5IN_H2O	81	\$ 6
	INSUL_PIPE_DI_2IN_H2O	3	\$ 8
	LF_PRE_RINSE_SPRAY_NZL	937	\$ 100
	LF_SHWR_HD_1.75_GPM_DI	754	\$ 25
	SALON_NOZZLE	395	\$ 100
	THERMOSTAT	1,003	\$ 126
C&I Multifamily	Air Sealing_MF	2,513	Average Incentive based on measure mix
	CUST NON-LGT_MF	234	
	Faucet Aerator_MF	219	
	Insulation_MF	5	
	Low-Flow Showerhead_MF	55	
	Pipe Wrap (Water Heating)_MF	27	
	Programmable Thermostat_MF	1,111	
	TSV Showerhead_MF	271	

2018 Measurement and Verification Plan

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1. Introduction

In 2018, National Grid's Measurement and Verification Plan (M&V) will focus on evaluating Rhode Island-specific sites and markets while leveraging as many resources as possible from studies in additional National Grid territories in order to keep costs low. Evaluation budgets are included in Attachment 5, Table E-2 and Attachment 6, Table G-2. The planned studies briefly described in this section focus on areas of interest to the Rhode Island programs, and build on the deep history of evaluation studies performed by the Company over many years. In order to optimize the use of evaluation resources, where programs are considered to be similar in program delivery and population served with those offered in Massachusetts, the studies will be done in conjunction with the Company's Massachusetts retail affiliate.

2. Evaluation study summary table

Table 1 lists planned Rhode Island studies 2018 including budgeted costs. Rhode Island will also stay abreast of the voluminous Massachusetts evaluation activities that may be beneficial / applicable in Rhode Island. These Massachusetts studies that may be considered for adoption or leveraging are shown in Table 2.

Study labeling codes have been added to the study names to facilitate distinct identification. The codes take the general form: [state] – [year started] – [sector, fuel] – [keyword], where sectors are: R = residential, C = commercial, X = cross sector, and fuels are: E = electric, G = gas, X = electric & gas. For example, RI-17-CX-CDA refers to the Comprehensive Design Assessment (CDA) study started in 2017 in the Commercial sector for electric & gas (X) fuels; RI-18-RE-UpstrLtNTG is a 2018 residential electric upstream lighting net-to-gross (NTG) study.

Table 1. List of Planned EM&V Studies in 2018

Sector	Study Code	Type	Affected Programs	Study Name	State Lead	2018 Plan	Notes	Estimated cost
Res	RI-18-RX-LISF	Impact	Income eligible	Impact Evaluation of Income Eligible Single Family Program	RI	Yes		\$ 130,000
Res	RI-18-RX-MF	Impact	Multifamily	Multifamily Program Follow-up Evaluation	RI			\$ 100,000
Res	RI-17-RE-Loadshape	Impact	Multiple	Residential Electric Load Shape	MA	TBD	Review RI applicability	\$ -
Res	RI-18-RE-MAM	Impact	Residential Lighting	Residential Lighting - MAM	RI	Yes		\$ 50,000
Res	RI-18-RE-UpstrLtNTG	NTG	Residential Lighting	Residential Lighting NTG	MA	TBD		\$ 50,000
C&I	RI-17-CX-CDA	Impact	Custom	Comprehensive Design Approach (CDA) Impact evaluation	RI	Yes	MA-P56	\$ 50,000
C&I	RI-17-CE-UpstrLt	impact	Upstream Lighting	Impact Evaluation for Upstream Lighting Program	RI	Yes	MA-P58	\$ 50,000
C&I	RI-17-CE-SBS	impact	SBS	SBS custom (MA in work plan stage)	RI	Yes	MA-P69	\$ 75,000
C&I	RI-17-CE-Controls	Impact	C&I Retrofit	Method Development and Evaluation of Controls	MA	Yes	MA-P71	\$ 50,000
C&I	RI-17-CG-UpstrDHW	Impact	Prescriptive Gas	Upstream Water Heater Deemed Savings Impact Evaluation	MA	Yes	MA-P77	\$ 75,000
C&I	RI-17-CE-UpstrLtNTG	NTG	Upstream Lighting	Upstream LED Net-to-gross Analysis	MA	Yes	MA-P78	\$ 50,000
C&I	RI-17-CG-CustGas	Impact	Custom	Impact Evaluation of Custom Gas Installations	RI	Yes	MA-P79	\$ 125,000
C&I	RI-17-CE-CustElect	Impact	Custom	Impact Evaluation of Custom Electric Installations	RI	Yes	MA-P80	\$ 125,000

C&I	RI-17-CG-PrescGas	Impact		Impact Evaluation of Prescriptive Gas Installations	MA	No	Budget cut	\$ -
C&I	RI-17-CE-PrescElect	Impact		Impact Evaluation of Prescriptive Electric Installations	MA	No	Budget cut	\$ -
C&I	RI-17-CX-Baseline	Impact	Multiple	Baseline Transition Planning	MA	TBD	MA-P73	\$ 15,000
C&I	RI-17-CE-LEDMarket	Market	Lighting	LED Market Monitor	MA	TBD	MA-P75	\$ 40,000
Cross	RI-17-XX-AESCost	Benefits	Multiple	Avoided cost (Regional Study)	RI	Yes		\$ 70,000
Cross	RI-18-XX-Finance	Process		Finance study (heat loan, OBR, etc.)	RI	Yes		\$ 50,000
Cross	RI-18-XX-Participation	Market	Multiple	Customer Participation Study – Phase 2	RI	Yes		\$ 200,000
Cross	RI-17-XX-Potential	Market	Multiple	Potential Study	RI	Yes		\$ 85,000
Cross	RI-18-XX-Jobs	External	Multiple	Jobs study	RI	Yes		\$ 40,000
Cross	RI-18-XE-SRP	Impact	Multiple	System Reliability Procurement (SRP)	RI	Yes		\$ 20,000
Cross	RI-18-XX-Demos	Impact	Multiple	Demonstrations/Pilots	RI	Yes		\$ 276,017
Cross	RI-18-XX-NEEP		Multiple	NEEP EM&V Support	RI	Yes		\$ 20,000
Cross	RI-18-XX-REMI	Benefits	Multiple	REMI model / \$ benefit study	RI	Yes		\$ 50,000
Cross	RI-18-XX-Summary	External	Multiple	Summary study of evaluation activity	RI	No	Budget cut	\$ -
Cross	RI-18-XX-Pooling	Impact	Multiple	Analytical Assessment of Leveraging Evaluations	RI	Yes		\$ 225,000
Cross	RI-18-XX-Ad hoc		Multiple	Ad-hoc consultants		Yes		\$ 75,000
							2018 RI Budget total	\$ 2,096,017

Table 2. List of Massachusetts Studies Relevant to Rhode Island

Sector	Fuel	Study Type	Affected programs	Study Name	MA Study Code
Res	Elec	Impact	Multiple	Smart Power Strip Metering Study	RLPNC 17-3
Res	Elec	Impact	Multiple	Smart Strip Lit Review and Customer Survey	RLPNC 17-4
Res	Elec & Gas	Process	MF	Multifamily Program Research	RES-42
Res	Elec	Process	HVAC	Ductless Mini-Split Heat Pump Incremental Cost Study	RES-28
Res	Elec	Process	HVAC	Ductless Mini-Split Heat Pump Survey	RES-29
Res	Elec & Gas	Impact	HVAC/HES	Heating and Cooling Early Retirement NTG	RES-36
Res	Gas	Benefits	HVAC	Water Heating, Boiler and Furnace Cost Study	RES-19
Res	Elec & Gas	Process	Income eligible	Income Eligible Process Evaluation	RES-38
C&I	Elec	Market	Multiple	C&I Lighting and Controls Market Effects Study	P-53
C&I	Elec & Gas	Market	All C&I	Assessment of Incentivized High Efficiency Equipment	P-61
C&I	Elec & Gas	NTG	Codes	C&I Code Compliance Follow-Up Study	P-70
C&I	Elec	Impact	Multiple	Prescriptive C&I Loadshapes of Savings	P-72
C&I	Elec & Gas	Market	All C&I	C&I 2011-2015 Mid-size Customer Needs Assessment	P-68
S&CC	Elec & Gas	Impact	MF	Market-Rate Rental Property NEI Study	TXC-29
S&CC	Elec & Gas	Market	HVAC	Residential HVAC NTG and Market Effects Study	TXC-34
S&CC	Elec & Gas	Market	Upstream HVAC	C&I Upstream HVAC NTG & Market Effects Study	TXC-35
S&CC	Elec & Gas	Market	HVAC	HVAC Manufacturer Panel Maintenance and Data Collection	TXC-36
S&CC	Elec & Gas	Market	HVAC	HVAC Research Coordination	TXC-37
S&CC	Elec & Gas	Impact	Multiple	Top Down Muni Exploration	TXC-43
S&CC	Elec & Gas	Market	Multiple	NTG Research Coordination	TXC-45
S&CC	Elec & Gas	Process		CBP Design and Marketing Effectiveness	

3. Residential Studies

a. RI-18-RX-LISF - Impact Evaluation of the Income Eligible Single Family Program

This study is a Rhode Island specific impact evaluation of the income-eligible single family services program. The program seeks to increase energy efficiency of low income customers by educating customers about energy efficient practices and installing energy efficient measures at no cost to customers. This study will provide estimates of electric and gas savings resulting from participation in in-home retrofit of lighting and other electric and gas product measures (eg advanced power strips, showerheads / aerators, etc.) and weatherization of electric, gas and fossil fuel heated homes.

b. RI-18-RX-MF - Multifamily Program Follow-up Evaluation

A billing analysis evaluation of the multifamily program was performed in 2015-2016, and found substantially lower savings than had historically been claimed. Even as the study results were being tallied, changes were being implemented to more appropriately estimate savings, for example: controls were put on air sealing estimates that exceeded energy engineering experience, baseline gas heating system efficiency was increased (based on typical 'average' heating system efficiency), and vendor entered lighting hours of use were adjusted downward to be more in-line with lighting Hours of Use study results. This proposed study will mirror and/or leverage a similar Massachusetts study to verify that program changes are leading to accurate savings estimates; the study approach will take into account the fact that Massachusetts & Rhode Island made different adjustments to program delivery based on the most recent multifamily evaluation.

c. RI-17-RE-Loadshape - Residential Electric Load Shape

Many residential programs rely on the load shape information to determine kW benefits. This study will either leverage the Massachusetts residential baseline study, or directly use the Massachusetts results if they are found to be sufficiently applicable in Rhode Island. The study is collecting saturation, penetration, and usage behavior data for all major electric and gas appliances, mechanical equipment, and electronics in Massachusetts homes. Around 478 onsite end use metering sites will be used to derive load shapes. Rhode Island will review the outputs of the Massachusetts study (i.e. scale of changes to existing

values, potential demographic differences, etc.) to determine if results can be used directly. If not, a Rhode Island sample may be added to the study.

d. RI-18-RE-MAM - Residential Lighting – Market Adoption Model

Rhode Island will leverage the Massachusetts Market Adoption Model (MAM) work for 2019 planning purposes, as has been done in recent history. The MAM updates lighting gross kWh and kW savings values, as well as measure lives and in service rates.

e. RI-18-RE-UptsrLtNTG - Residential Lighting Net-to-Gross

This study will leverage the work done for the MA residential LED Freeridership / Spillover study and will include a Rhode Island sample of customers and supplier interviews in an effort to assess Rhode Island residential lighting Net-to-Gross values for 2019 and beyond.

4. Commercial and Industrial (C&I)

a. Custom Electric & Gas – Impact Evaluations

Custom studies that are expected to continue into 2018 are shown below:

- RI-17-CX-CDA - The Comprehensive Design Assessment (CDA) measure study is leveraging a similar study in Massachusetts by pooling results for National Grid sites in Rhode Island and Massachusetts. Field monitoring occurred in 2017 for the study, and is expected to complete in early 2018. CDA savings for new construction or gut-rehab projects are typically estimated for both electric and gas measures based on modeling, where evaluation efforts are likely to also focus.
- RI-17-CE-UpstrLt - The Upstream Lighting study is a Massachusetts leveraged study started in mid-2016 and may complete by the end of 2017. The study involves on-site metering of customer sites to assess savings estimates across the population of upstream lighting customers.
- RI-17-CE-SBS - The Small Business Services (SBS) will leverage a Massachusetts study that will update impact factors for the SBS custom program. The SBS custom program has been growing due to the Customer Directed Option (CDO) which allows implementation vendors to customize projects to customer needs.

b. RI-17-CE-Controls - Method Development and Evaluation of Control Measures

The goals of this study are to identify and develop best practices for monitoring and evaluating impacts from controls-based energy efficiency measures. In 2016, the Massachusetts and Rhode Island program administrators implemented an initiative for corporate leadership of franchise fast food stores, that could be offered to franchise owners, where a suite of measures (lighting, EMS controls, HVAC) were offered along with incentives/financing, with the goal of scalability. Rhode Island will leverage the Massachusetts formal evaluation of this initiative by including a Rhode Island sample, to assess evaluated savings.

c. RI-17-CG-UpstrDHW - Upstream Water Heater Deemed Savings Impact Evaluation

The primary objective of this study will be to develop deemed gross natural gas savings values for the recently created C&I Upstream Water Heater program offering. In 2016, the company introduced a C&I gas upstream water heating program in both RI and MA that estimated savings based on historic deemed savings values and engineering estimates for new measures. The Massachusetts program administrators are evaluating these savings estimates, beginning with testing different M&V methods; Rhode Island will join the MA study once the evaluation methods have been established.

d. RI-17-CE-UpstrLtNTG - Upstream LED Net-to-Gross Analysis

The upstream delivery approach changes the Net-to-Gross (NTG) dynamics, since not all customers are aware of incentives, and the customers don't know how large of an incentive was paid. Also, the LED marketplace is changing very rapidly, so subject matter experts can be a valuable source for assessing program influence. The primary objective of this study will be to develop NTG ratios for C&I LED products in Rhode Island in coordination with Massachusetts.

e. RI-17-CG-CustGas - Impact Evaluation of Custom Gas Installations

The objective of this impact evaluation is to provide verification of natural gas energy savings estimates for a sample of custom gas projects through site-specific inspection, metering, and analysis. The results of this study will be used to determine the realization rates for custom gas energy efficiency offerings based on installations from 2016. This

will be the first of several ‘rolling’ evaluations in coordination with evaluation efforts in Massachusetts, where the first year will be a ‘full’ study (as has historically been done every 3 years), while subsequent years will evaluate roughly 1/3 of the number of sites, which will keep the realization rates updated yearly.

f. RI-17-CE-CustElect - Impact Evaluation of Custom Electric Installations

The objective of this impact evaluation is to provide verification of electric energy savings estimates for a sample of custom electric projects through site-specific inspection, metering, and analysis. The results of this study will be used to determine the final realization rates for custom electric energy efficiency offerings based on installations from 2016. This will be the first of several ‘rolling’ evaluations in coordination with evaluation efforts in Massachusetts, where the first year will be a ‘full’ study (as has historically been done every 3 years), while subsequent years will evaluate roughly 1/3 of the number of sites, which will keep the realization rates updated yearly.

g. RI-17-CX-Baseline - Baseline Transition Planning

The primary objective of this effort will be to coordinate protocols and timelines for implementing the principles set forth in the Massachusetts C&I Baseline Framework Document, which are also expected to be applied in Rhode Island. Over the past year or so, MA evaluation has worked to formalize the process of establishing baselines; since the company’s MA & RI affiliates use the same technical review groups, the baseline selection processes will primarily be used in both states, with the exception of baseline differences such as code adoption cycles or demographics. This effort may combine with the Assessment of Pooling study listed below.

h. RI-18-CE-LEDMarket – C&I LED Market Monitor

The primary objective of this study leveraged with Massachusetts will be to provide the EERMC consultants, on an ongoing basis, with information and data that can be used to update the characterization of the baseline for LED lamps and fixtures.

5. Cross-Sector Studies

a. RI-17-XX-AESCost - Avoided Cost Study, Gas & Electric

This study will provide updated avoided costs in support of determining least cost procurement decisions through the benefit-cost screening process. With the recent fluctuations in energy pricing, the study will re-affirm the long term energy cost estimates. The study will be conducted with regional program administrators.

b. RI-18-XX-Finance - Customer Finance evaluations

A study will be developed and fielded to support the ongoing assessment of financial products for residential and commercial customers, such as: Heat Loan for HVAC, On-bill-repayment, and 3rd party financing. Specific study objectives and research questions will be developed in partnership with evaluation teams from the EERMC.

c. RI-17-XX-Participation - Customer Participation Study – Phase 2

Phase I of the study assessed the characteristics of residential and small business customers that participate in several direct install programs including: EnergyWise Single Family, Income Eligible Single Family, EnergyWise Multifamily, Income Eligible Multifamily, C&I Multifamily and Small Business Direct Install. The study estimated the number of remaining customers available for increasing participation in the energy efficiency programs and provided recommendations on targeting participants. Phase I will be completed by the end of 2017. Phase II will continue to research customer participation to address additional research topics identified in Phase 1 and other research questions such the effect of fuel price on program participation, employment in small businesses that are served in a program year and assessing rates of participants and non-participants to understand bill impacts from program participation.

d. RI-17-XX-Potential - Potential Study

The Company will investigate savings potential for 2019-2020 through a ‘quick hit’ study for gas and electric cost effective energy savings. This study will assess the technical, economic and achievable potential for cost effective energy savings in the near future, with the goal of proposing measures to address the “Innovation” line item shown in the RI 2018-2020 3 year plan. The study may include data based on customer site visits or surveys, or from recent Massachusetts customer visits and surveys. It will incorporate

recent evaluation results including non-energy impacts (NEIs), Free-ridership and spillover and market studies as well as assess these factors prospectively. It will use the Rhode Island test to determine cost-effectiveness. The potential study will cover residential, low income, and C&I sectors, and will be done in conjunction with the EERMC. Note that the last 'full' Technical Potential study was completed in 2010 by KEMA, Inc. for the EERMC; another Technical Potential Study will be done in 2019-20 to inform the 2021-23 Rhode Island three-year plan.

e. RI-18-XX-Jobs - Job Impacts Analysis Study

The Rhode Island job impacts study will determine the business and jobs impact due to energy efficiency programs in 2017, similar to the prior study. The study will survey the Company, vendors, distributors, partners, and market players to quantify the number of jobs and associated business impacts.

f. RI-18-XE-SRP - System Reliability Procurement Study

After several years of implementation effort on the system reliability procurement (SRP) pilot, this study will assess the savings and benefits achieved by the pilot program. The results from this study will be used to inform program design to further expand the program and benefits elsewhere in Rhode Island.

g. RI-18-XX-Demos - Demonstrations-Process and Impact Evaluations

Studies will continue to evaluate the process and impacts from residential pilots planned for the field, including residential water heater control, battery storage, and emerging lighting controls, and power monitoring (Sense) pilots. The studies involve a combination of billing analysis, on-site measurement, and customer surveys. The Company plans to begin evaluations as new products or pilots are launched. These studies will include both gas and electric impacts. Rhode Island may pool samples or leverage Massachusetts studies.

h. RI-18-XX-REMI - REMI model and Benefit Study

This third party evaluation will assess the economic benefits generated by the energy efficiency programs in the course of normal energy efficiency program operations. This study will potentially replace National Grid's current dollar benefits estimates.

i. RI-17-XX-Leveraging – Analytical Assessment of Leveraging Evaluations

This study will assess the validity and strategic desirability of Rhode Island's historic practice of using evaluation results from other states and/or leveraging evaluation studies from other states with a Rhode Island sample. This study will identify best practices and key parameters for consideration when a Rhode Island specific evaluation is not undertaken. This study will also estimate the monetary benefit of using and/or leveraging study results for various monitoring and verification purposes such as program improvement or ISO-NE verification.

j. RI-18-XX-NEEP - Regional Studies

Through the Company's participation in the Northeast Energy Efficiency Partnerships (NEEP) Evaluation, Measurement and Verification activities, the Company expects to participate in a number of regional evaluation studies. NEEP is currently developing its list of studies for 2018.

6. Recently Completed Evaluation Studies

Recently completed studies that have informed 2018 planning are identified in the chart below, along with a brief summary of the impact of those results in planning the Company's 2018 programs. Prior year studies that have been superseded by studies completed since the filing of the 2017 EEPP have been deleted from the list. The results of these studies were incorporated into the benefit-cost modeling of the 2018 plan. Some of these studies may be regional, or may have included other National Grid jurisdictions. The 2018 EEPP is adopting the results of these studies because the Rhode Island programs are judged to be similar, either in the measures offered, or in terms of structure or program delivery. In these instances, the impact evaluations have been judged by the Company to be applicable to its Rhode Island energy efficiency programs.

2017	
Study	Impact Descriptions
ILLUME Advising, LLC, Rhode Island Home Energy Report Program Impact and Process Evaluation. August 2017	This study estimated realization rates for electric and gas savings for program years 2014 to 2016 using a billing analysis. The realization rates from this study were adjusted to remove potential double counted savings from HER and other energy efficiency programs.
Navigant, Rhode Island Energy Efficiency Program Customer Participation Study – Phase 1, October 2017	The study characterized participants and non-participants in several energy efficiency programs and identified customers that can be potentially targeted to increase participation.
NMR, 2017 Rhode Island Single-Family Code Compliance/Baseline Study, July 2017	This study yielded the final agreed upon baseline values to update the User Defined Reference Home (UDRH) in Rhode Island
ICF, 2017 Rhode Island Residential Code Savings Analysis	This study found that the average Rhode Island home could attain annual electric savings of 3,690 kWh and gas savings of 10 MMBtu if it fully complied with the state’s building energy code.
NBI, 2017 Rhode Island Commercial Code Savings Analysis	This study found that the average Rhode Island commercial building could attain annual electric savings of 0.73 kWh/sf and gas savings of 0.90 MMBtu/sf if it fully complied with the state’s building energy code.
NMR, 2017 Rhode Island Code Compliance Enhancement Initiative Attribution and Savings Study	The study found residential and commercial attribution factors of 23% and 46, respectively, which were used along with study results on average savings as well as construction activity projections to calculate the CCEI’s projected savings from 2018-2020.
Peregrine Energy Group, Analysis of Job Creation from 2016 Expenditures for Energy Efficiency in Rhode Island by National Grid, April 2017	A study of the job impacts of National Grid’s energy efficiency programs delivered to Rhode Island electricity and natural gas customers in 2016. The study estimated that 702 FTE workers, across 923 companies and agencies were employed in 2016 as a result of investments energy efficiency programs in Rhode Island.
New Buildings Institute, Energy Impacts of Commercial Building Code Compliance in Rhode Island, July 2017	This study quantified the energy impacts of energy code compliance patterns from field data collection and analysis of building characteristics.
The Cadmus Group, Inc, Ductless Mini-Split Heat Pump Impact Evaluation, 2016	The 2018 PI plan includes ‘strategy electrification’ heat pump savings values that resulted from this study.
DNV-GL, Impact Evaluation of MA C&I upstream Lighting Program (September 2017 Draft)	Draft results from the MA study were used for the 2018 RI plan; the RI leveraged study is expected to be completed at the end of 2017.

DNV-GL, Impact Evaluation of 2014 Custom HVAC Installations, September 2017	The study updated realization rates for customer electric HVAC projects, as part of a study leveraging the MA study of the same program element.
DNV-GL, MA C&I Impact Evaluation of 2013 Custom Process Installations (August 2017 Draft)	Draft results from pooling the MA & RI samples were used for the 2018 RI plan. RI is currently working on a custom electric process evaluation leveraged on the MA study of the same program, and is waiting for MA to finalize their values.
TetraTech, C&I Programs Freeridership & Spillover Study, September 2017	This study updated free-ridership and spillover values for the C&I electric and gas programs.
DNV-GL, MA C&I Steam Trap Evaluation Phase 2 , Feb, 2017)	The 2018 RI plan C&I steam trap savings were updated based on results from the MA study.
DNV-GL, Gas Boiler Market Characterization Study Phase II: Final Report, March 2017	The 2018 RI plan C&I condensing boiler savings were updated based on the results from the MA boiler characterization study.
DNV-GL, MA45 Prescriptive Programmable Thermostats, March 2017	The 2018 RI plan uses results from the MA programmable thermostat study.
2016	
Study	Impact Descriptions
DNV-GL, Impact Evaluation of 2014 Custom Gas Installations in Rhode Island Final Report, July 2016	This study is RI-specific and yielded an energy realization rate for Custom Gas projects.
DNV-GL, Impact Evaluation of 2014 RI Prescriptive Compressed Air Installations Final Report, July 2016	This study is RI-specific and yielded an energy realization rate for prescriptive compressed air compressors, dryers, and EE accessories.
DNV-GL, Impact Evaluation of 2012 National Grid-Rhode Island Prescriptive Chiller Program Final Report, July 2016	This study is RI-specific and yielded an energy realization rate for prescriptive chillers.
DNV-GL, Multifamily Impact Evaluation, National Grid Rhode Island, January 2016	This study estimated realization rates for electric and gas savings for 2013 participants using a billing analysis. The results include a low level of precision and thus the realization rates are not applicable. The Company is improving tracking, savings estimations and verification processes in line with the study's recommendations.
Research Into Action, National Grid Rhode Island EnergyWise Single Family Process Evaluation, August 2016	This study surveyed customers, vendors, contractors, and lending agencies to order to assess customer experience, HEAT Loan lender perspectives on the program, performance of the lead vendor and sub-contractors and lessons learned from programs elsewhere in the country. The study will inform program design.

DNV-GL, Impact Evaluation of 2014 EnergyWise Single Family Program, National Grid Rhode Island, August 2016	This study estimated deemed savings values and realization rates for electric and gas 2014 participants using billing and engineering analysis. The Company adopted the deemed savings values in the 2017 program plan.
Massachusetts Special and Cross-Cutting Research Area: Low-Income Single-Family Health- and Safety-Related Non-Energy Impacts (NEIs) Study. Prepared by the NMR Group and Three3, Inc. for the Massachusetts Program Administrators. August 5, 2016.	This study developed Non Energy Impacts for low income programs, based on USODE's Weatherization Assistance Program tailored to MA context. Dollar benefits rose substantially over prior values primarily based on avoidance of deaths due to thermal stress.
Cadmus Group; Large Commercial and Industrial On-Bill Repayment Program Evaluation, September, 2016	National Grid commissioned this study to evaluate the financing component of their large commercial and industrial (LCI) energy efficiency program. Cadmus evaluated the program design, performance, and sustainability; the overall market for the program; and the program's penetration of that market to date.
Ductless Mini-Split Heat Pump (DMSHP) Final Heating Season Results; Ductless Mini-Split Heat Pump (DMSHP) Cooling Season Results, COOL SMART Impact Evaluation Team, 2015 / 2016	Heating and cooling memos that describe the number of full load hours found with field installed systems in MA and RI; these hours were used with historic data on incentivized systems to come up with average savings per unit.
2015	
Study	Impact Descriptions
DNV-GL, Rhode Island Small Business Energy Efficiency Program Prescriptive Lighting Study: Final Report, July 2015	This study is RI-specific and yielded an energy realization rate prescriptive lighting measures. For coincidence factors, the Company will continue to use values from the NEEP Evaluation, Measurement and Verification Forum.
Cadmus, Inc., High Efficiency Heating Equipment Impact Evaluation: Final Report, March 2015	The study determined revised deemed savings values for each furnace and boiler measure, including condensing boilers and early replacement of heating equipment. The study also reflected the increasing baseline for standard efficiency heating equipment.
DNV-GL, Retrofit Lighting Controls Measure Summary of Findings: Final Report (MA), October 2014	The study examined trends in lighting control savings and noted a decrease in savings over previous program years. It recommended updated coincidence factors as well as potential program and technology areas that may yield higher savings. Finally, the study recommended a change in the savings calculation algorithm for lighting controls.

Tabors Caramanis Rudkevich, Avoided Energy Supply Costs in New England: 2015 Report, April 2015	This study developed new estimates of avoided costs for application in 2016 through 2018 energy efficiency programs throughout the six New England states. Avoided costs were developed for natural gas, electric energy, electric capacity, demand reduction induced price effects (DRIPE), other fuels (oil, propane and wood), and carbon.
DNV-GL, Massachusetts 2013 Prescriptive Gas Impact Evaluation; Steam Trap Evaluation Phase 1, March 2015	The study concluded that there should continue to be both prescriptive and custom pathways for steam trap retrofit incentives, and further recommended that a group convene to review and revise the deemed savings estimate for steam traps. The study also recommended the use of a six year lifetime for steam traps.
Cadmus, Inc., LED Incremental Cost Study – Modeling LightTracker LED and Halogen Pricing Data, June 2015	This memo summarizes selected findings from the LightTracker LED, CFL, and halogen pricing data modeling effort and the resulting state-level price forecast through 2020 for LED, CFL, and halogen bulbs. These results are based on light bulb price data from 25 states that lacked LED programs from 2009 to 2014.
Cadmus, Inc, Cool Smart Incremental Cost Study: Final Report, July 2015	This incremental cost study estimates how manufacturing production costs (MPCs) and purchase prices of residential air conditioning (AC) and heat pump (HP) equipment change as equipment efficiency increases. The results support Cool Smart program enhancements and cost-effectiveness analysis, as well as potential upstream residential upstream heating, ventilation and air conditioning (HVAC) incentive programs.
Cadmus, Inc., Lighting Interactive Effects Study Preliminary Results – Draft, April 2015	This memo details the preliminary findings of the Lighting Interactive Effects study evaluated for the Massachusetts (MA) Program Administrators to better understand and report the true impact of energy efficient lighting retrofits. It recommended factors for electric and gas energy to be applied to residential program savings.
2014	
Study	Impact Descriptions
DNV GL, 2014 , Impact Evaluation of National Grid Rhode Island C&I Prescriptive Gas Pre-Rinse Spray Valve Measure	The evaluation examined the gas and water savings associated with the installation of reduced-flow pre-rinse spray valves. The results are based on site measurements from MA and RI facilities. The final gross gas and water savings are 11.4 MMBtu and 6.410 gallons per spray valve respectively.

DNV GL, 2014 Impact Evaluation of National Grid Rhode Island Custom Refrigerator, Motor and Other Installations	Three custom electric end-uses, Refrigerator, Motor, and Other, were evaluated to provide updated realization rates. The RI results were combined with MA results from a parallel study in order to increase the statistical significance of the final results. The final energy realization rate is 84.8%
DNV GL, 2014 Impact Evaluation of Rhode Island Commercial and Industrial Upstream Lighting Program	This study examined the performance of lighting systems that were discounted at the distribution level. The evaluation included metering at Rhode Island project sites that was combined with the results of metering done in MA to yield more accurate impacts for lighting offered in this upstream initiative. The final energy realization rate is 80.3% for LEDs and 109.5% for fluorescents.
NMR Group, Inc., Northeast Residential Lighting Hours-of-Use Study	This multi-State study provided updated hours-of-use assumptions for residential lighting programs in various room types.
The Cadmus Group, Impact Evaluation: Rhode Island Income Eligible Services, Volume II The Cadmus Group, National Grid Income Eligible Services Process Evaluation	This RI-specific impact evaluation focused on the electric and gas savings resulting from the participation of these dwellings in in-home retrofit of electrical components and weatherization of electric, gas, and fossil fuel heated homes. It used billing analysis, engineering reviews, and interviews for the process components.
National Grid, Macroeconomic Impacts of Rhode Island Energy Efficiency Investments REMI Analysis of National Grid's Energy Efficiency Programs	This study quantifies the macroeconomic impacts of National Grid's 2014 EE Program Plan for Rhode Island and provides updated economic impact multipliers to quantify the benefits of future EE programs in the Rhode Island economy. This updates the multipliers from an economic impact study conducted by Environment Northeast (ENE) in 2009.
2013	
Study	Impact Descriptions
KEMA, Inc., Impact Evaluation of 2011 Rhode Island Prescriptive Lighting Installations KEMA, Inc., Impact Evaluation of 2011 Rhode Island Custom Lighting Installations	The Custom and Prescriptive Lighting studies involved the impact evaluation of components of the Large Commercial and Industrial electric efficiency programs. The studies included on-site engineering and end-use metering of a statistically drawn random sample of participants. The custom portion of the study was coupled with the results of the 2013 Massachusetts Custom Lighting study.

Energy Efficiency Messaging, Residential Energy Efficiency Program Communications Focus Groups	The study analyzed customers' perceptions of energy efficiency programs and messaging materials via focus group testing.
KEMA, Inc., Impact Evaluation of 2011 Prescriptive Gas Measures	On-site monitoring and verification of installation provided updated impacts for four major prescriptive gas measures. Programs and measures are similar between National Grid affiliates in MA and RI, and results are applied to RI. The overall realization rate for the four measures was approximately 102% and the relative precision was about $\pm 15\%$.
KEMA, Inc. and DMI, Inc., Impact Evaluation of 2011-2012 Prescriptive VSDs	This evaluation provided a new estimate of the impacts of prescriptive variable speed drives, based on pre-post metering of measures installed in 2011 and 2012. Programs and measures are similar between National Grid affiliates in MA and RI, and results are applied to RI. Key findings include an annual kWh realization rate was 94% with a relative precision of $\pm 23\%$, and identification of factors that influenced the realization rate.
The Cadmus Group, Inc., 2012 Residential Heating, Water Heating, and Cooling Equipment Evaluation: Net-to-Gross, Market Effects, and Equipment Replacement Timing	The results of this study yielded updated net-to-gross factors and estimates of the timing of equipment replacement for residential heating and cooling measures. Programs and measures are similar between National Grid affiliates in MA and RI, and results are applied to RI.
KEMA, Inc., Process Evaluation of the 2012 Bright Opportunities Program	This study provided net-to-gross ratios for the Commercial Upstream Lighting initiative offered in MA and RI, as well as a process assessment of this generally successful initiative.
KEMA, Inc., Impact Evaluation of 2010 Prescriptive Lighting Installations	The RI Prescriptive lighting study listed above did not examine case lighting separately from other lighting systems. To complement the RI-specific results, this MA study provided impact updates on case lighting.
Opinion Dynamics (2013). Massachusetts Cross-Cutting Behavioral Program Evaluation Integrated Report.	This study provided an updated realization rate for savings from gas customers who participate in the Opt-out channel of the Home Energy Reports program.
2012	
Study	Impact Descriptions

KEMA, Inc., Impact Evaluation of the 2010 Custom –Industrial Process and Compressed Air impact evaluation, September, 2012	Study produced realization rates for energy, seasonal demand, and percent energy on peak for both programs. The RI results were combined with MA results from a parallel study in order to increase the statistical significance of the final results. The final energy realization rate is 92.7%.
TetraTech, Final Report – Commercial and Industrial Non-Energy Impacts Study, (prepared for Massachusetts Program Administrators), June 29, 2012	This report provides a comprehensive set of statistically reliable Non-energy impact (NEI) estimates across the range of C&I prescriptive and custom retrofit programs offered by the MA electric and gas Program Administrators (Pas). The analytical methods used allow this report’s findings to be applicable to RI.
2011	
Study	Impact Descriptions
NMR Group, Inc., The Rhode Island Appliance Turn-In Program Process Evaluation, March 4, 2011.	Combined, these two studies assessed free-ridership rates and savings for the Rhode Island Refrigerator and Freezer Recycling program. In addition, the evaluation found that there were three distinct groups of refrigerators being recycled through the program – primary, secondary – replaced, and secondary – not replaced. The study produced updated free-ridership rates and savings for the three categories of refrigerators and freezers.
NMR Group, Inc., The Rhode Island Appliance Turn-In Program Impact Evaluation, October 2011.	
KEMA, Inc., Impact Evaluation of the 2009 Custom HVAC and 2008-2009 Custom CDA Installations, September 1, 2011	Study produced realization rates for energy, seasonal demand, and percent energy on peak for both programs. The RI results were combined with MA results from a parallel study in order to increase the statistical significance of the final results. The final energy realization rate for Custom HVAC is higher than the PY 2011 realization rate by about 10% (increased from 100.5% to 110.4%). The final energy realization rate for Custom CDA is higher than the PY 2011 realization rate by about 20% (increased from 97.2% to 119.6%).

KEMA, Inc., C&I Lighting Loadshape Project, Prepared for the Regional Evaluation, Measurement, and Verification Forum, June 2011.	A compilation of lighting loadshape data from the Northeast. The study provided updated coincidence factors for the Energy Initiative and Small Business Lighting programs. The Small Business program summer coincidence factor went from 0.80 to 0.79, while the Energy Initiative summer coincidence went from 0.88 to 0.89
KEMA, Inc., C&I Unitary HVAC Loadshape Project Final Report, Prepared for the Regional Evaluation, Measurement, and Verification Forum, June 2011.	From end use metering, the study produced updated diversity and equivalent full load hours for unitary HVAC measures
2010	
Study	Impact Descriptions
ADM Associates, Inc., Residential Central AC Regional Evaluation, Final Report, October 2009	KWh and kW savings figures for the installation of efficient residential CAC systems
2007	
Study	Impact Descriptions
RLW Analytics, Small Business Services Custom Measure Impact Evaluation, March 23, 2007	Verification of energy savings from custom lighting projects in the Small Business Services program.
RLW Analytics, Impact Evaluation Analysis of the 2005 Custom SBS Program, May 29, 2007	Realization rates for the Small Business Services program

7. Evaluation Study Findings

Study name: Rhode Island Home Energy Report Program Impact and Process Evaluation

Type of Study: Impact and Process Evaluation

Evaluation Conducted by: Illume Advising, LLC

Date Evaluation Conducted: 2017

Evaluation Objective and High Level Findings:

This objective of this study is to measure the savings associated with the Home Energy Reports program and to assess the program's design and delivery. The evaluation included program process and materials review, impact assessment of the different treatment cohorts and customer segments.

The study found that customers saved 39,974 MWh and 1,392,071 therms over 2015 to 2016 program periods. These results translate into a weighted realization rate of 88 percent for electric and 108% for natural gas.

Programs to which the Results of the Study Apply:

Residential Behavioral Electric and Gas Programs

Evaluation Recommendations included in the study:

For planning purposes, use a 2015-2016 weighted average electric realization rate of 88% and gas realization rate of 108%. Numerous factors can cause savings and the alignment of reported and evaluated savings to fluctuate from year to year. The evaluation team recommends using a weighted average realization rate for future planning to minimize variability. The evaluation team does not recommend including 2014 results in this average as only 7 months were included in the 2014 analysis

Continue to monitor the average household savings value for electric customers. If a pattern of declining household savings emerges over time, consider additional efforts to increase customer engagement.

Consider including language tying tips and "ways to save" to related energy efficiency programs. While the reports contain specific marketing modules for energy efficiency programs, there is often no reference to these programs in other sections of the report where energy-saving actions are discussed. For example, when recommending ENERGY STAR appliances, reports could reference the ENERGY STAR products program in the same module.

If National Grid reinstates the New Movers program in the future, National Grid could consider conducting qualitative research with this group to understand their needs and how they use and understand the reports. While it is difficult to quantify savings from the reports, qualitative research may help National Grid understand the value of these reports to customers.

Going forward, the evaluation team recommends that National Grid use the impact results from the existing customer (non-New Mover) cohorts for planning purposes for all participants. As Opower is not continuing the New Movers initiative, and previous New Mover participants will receive standard report messaging, the evaluation team feels that the overall realization rates from the existing customer cohorts are most appropriate to use for planning purposes.

If, in the future, National Grid considers launching an email-only cohort, the evaluation team recommends starting with a small pilot RCT study to accurately assess whether email-only reports are more or less effective than paper reports. To do this, the implementation team should randomly assign customers who have email addresses on file to either treatment or control groups. Using a population of customers with emails on file would account for any demographic or behavioral differences that may be inherent to customers who prefer emails as opposed to other forms of communication.

If National Grid should decide to target higher baseline electric customers, the evaluation team recommends weighing the costs carefully and making any changes incrementally, starting with customers in the lower tenth percentile for baseline electricity usage. As removing customers from the program will also affect energy efficiency program marketing opportunities, customer touchpoints, gas savings (for dual fuel waves), and possibly customer satisfaction, any changes to current practice should consider these effects.

If AMI data are available in the future, the evaluation team recommends using hourly meter data to calculate more precise demand savings estimates. Using AMI or “smart meter” hourly data is the most accurate way to assess the effect of the program on demand. However, this may not always be feasible given the availability of these data. We do not recommend installing meters for this purpose, but if, in the future, most customers have “smart meters,” we recommend using the data for analysis of demand savings.

Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:
The Company will use study results in program planning and reporting in 2018. The results from this study will be considered to inform future program design.

Savings Impact: The realization rates were used to adjust gross electric and gas savings.

Study name: Rhode Island Energy Efficiency Program Customer Participation Study (October 2017 draft)

Type of Study: Market

Evaluation Conducted by: Navigant

Date Evaluation Conducted: 2017

Evaluation Objective and High Level Findings:

This objective of this study is to assess customer participation in its Rhode Island residential and small business energy efficiency programs between 2009 and 2015. The programs analyzed the were EnergyWise Single Family, Income Eligible Single Family, EnergyWise Multifamily, Income Eligible Multifamily, Residential New Construction and Small Business Direct Install.

The study assessed historical participation rates and characterized of participants and non-participants. The tables below provide a summary of the participation rates for each program.

Participation Rates for Each Program: 2009-2015

Program	Fuel	Participating Accounts		Eligible Accounts	Participation Rate*		Repeat Rate**
		Additive	Cumulative		Additive	Cumulative	
EnergyWise Single Family	Electric	49,104	44,052	324,491	15.1%	13.6%	11%
	Gas	10,979	10,182	186,940	5.9%	5.4%	8%
Income Eligible Single Family	Electric	16,092	13,947	27,902	57.7%	50.0%	15%
	Gas	2,040	1,983	14,462	14.1%	13.7%	3%
Small Business Direct Install	Electric	7,176	6,141	24,896	28.8%	24.7%	17%
	Gas	838	824	17,892	4.7%	4.6%	2%

*Calculated based on the total number of eligible accounts for each program

** Calculated as (Additive Participants – Cumulative Participants) / Cumulative Participants

Source: Navigant analysis of National Grid data

The characteristics of residential single family customers who are most likely to participate include: owners of one family structure who have authority to make building upgrades, customers who have lived at their home for 3 to 13 years, residents of buildings between 20 to 85 years old. For small business, retail, accommodation or food services industries are most likely to participate.

For the Residential New Construction program, the cumulative participation from 2009 through 2015 was 1,469 projects participating in the program specifically in new construction, and 3,005 projects participating in the program including both new construction and renovation. Based on estimated single family new housing starts from Moody's Analytics, the participation rate based for single family new construction only was 28%.

The assessment of multifamily programs provided limited analysis due to challenges with the multifamily data. The study provided the annual program participation for each of the multifamily electric and gas programs (shown in the table below) but was unable to provide a robust characterization of participants and non-participants.

Annual Program Participation (Facilities) in Multifamily Programs: 2009-2015

Year	2009	2010	2011	2012	2013	2014	2015	Additive	Cumulative
EnergyWise Electric	33	78	49	46	41	80	125	452	406
EnergyWise Gas	21	21	22	29	19	46	58	216	200
Income Eligible Electric	13	30	35	40	54	62	52	286	196
Income Eligible Gas	6	4	1	9	27	41	61	149	139

Source: Navigant analysis of National Grid data

Programs to which the Results of the Study Apply:

Residential EnergyWise Single Family Electric and Gas Programs
Residential Income Eligible Single Family Electric and Gas Programs
Residential EnergyWise Multifamily Electric and Gas Programs
Residential Income Eligible Multifamily Electric and Gas Programs
Residential New Construction Programs
Small Business Direct Install Electric and Gas Programs

Evaluation Recommendations included in the study:

Existing marketing efforts are robust, yet opportunity remains to be even more targeted.

- Increase Target Marketing. Devise marketing strategies that speak more directly to the underrepresented customer segments. The marketing should use messaging that engages the desired customer base, even if the fundamental program design and rebate offerings remain essentially the same. For example, select opportunities for prize rewards (e.g., sporting tickets) could be the key enticement to generate new interest.
- Continue Practice to Aggressively Follow Up with Partial Participants. Review the existing audit records to market to those customers who did the initial audit, but never applied for the broader rebates identified as applicable. Consider contacting homeowners with limited time promotional offerings (e.g., bonus incentives) to encourage follow up, so they address the larger whole building energy efficiency opportunities (e.g., weatherization).

Performance goals, while in place for most lead vendors, could be tailored further to drive key desired results.

- Target Performance Awards. Expand on existing performance goals with trade allies and lead implementation contractors to reward goal attainment with targeted customer groups.

Flexible incentive designs in some programs – incentives can be reduced when incentive dollars are used too quickly and increased to address lower interest periods.

- Dynamic Incentives. Request broader flexibility to adjust incentive levels as needed throughout the course of the year to maximize savings and reach target customer groups. Greater incentive flexibility would allow National Grid to be more dynamic in responding to market conditions.

Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:
The Company will use study results to inform program planning 2018.

Savings Impact: N/A

Study name: 2017 Rhode Island Single-Family Code Compliance/Baseline Study

Type of Study: Impact

Evaluation Conducted by: NMR

Date Evaluation Conducted: 2017

Evaluation Objective and High Level Findings:

The purpose of this study was to update the User Defined Reference Home (UDRH), a residential construction baseline seeking to quantify typical RI building practices that is used by the RI Residential New Construction (RNC) program. The study found that the UDRH became significantly more efficient compared to the preceding 2012 version.

Programs to which the Results of the Study Apply:

RI RNC (including the Code Compliance Enhancement Initiative (CCEI))

Evaluation Recommendations included in the study:

Each of the 70+ individual UDRH inputs were analyzed after a thorough review of data collected as part of this study as well as other available data sources. NMR, National Grid, the program vendor (CLEAResult), and the EERMC evaluation consultants each contributed to this process. It was recommended that each input be updated to its corresponding consensus value. While many of these inputs were adjusted to a more efficient value to reflect the data collected, some values remained the same or were even set to less efficient values than in the previous UDRH. Note that all of these changes are not included here for the sake of brevity.

Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:

The results from this study were adopted outright and used in subsequent studies to determine the energy savings potential for CCEI.

Savings Impact: See the 2017 Rhode Island Residential Code Savings Analysis for the savings impact for CCEI.

For the remainder of the RNC program, a subsequent analysis shows a significant estimated energy savings loss for the RNC program homes as a result of updating the UDRH:

winter kW	summer kW	Gas	Elect	Oil	Propane
-48%	-58%	-37%	-65%	-66%	-36%

Study Name: 2017 Rhode Island Residential Code Savings Analysis

Type of Study: Impact

Evaluation Conducted by: ICF

Date Evaluation Conducted: 2017

Evaluation Objective and High Level Findings:

The purpose of this study was to estimate the technical potential for residential buildings relative to the updated UDRH baseline. Energy modeling found that the average RI home could attain annual electric savings of 3,690 kWh and gas savings of 10 MMBtu if it fully complied with the state's building energy code.

Programs to which the Results of the Study Apply:

RI Residential New Construction (Code Compliance Enhancement Initiative (CCEI))

Evaluation Recommendations included in the study:

It was recommended that the following average energy savings technical potential figures be used to determine the CCEI's net savings (post-attribution) as part of National Grid RI's 2018-2020 plan filing.

2012 IECC savings over RI UDRH

Savings by Primary Heating Fuel	Propane Weighted Savings	Oil Weighted Savings	Natural Gas Weighted Savings	Electric Weighted Savings	Total Weighted Savings
Total Electric Savings (kWh)	2,630	2,625	2,630	6,346	3,690
Total Fossil Fuel Savings (MMBtu)	14	14	14	0	10.06
<i>Total Fuel Savings (Fossil Fuel + Electric, MMBtu)</i>	<i>23</i>	<i>23</i>	<i>23</i>	<i>22</i>	<i>22.65</i>

Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:

The results from this study were adopted outright and used in a subsequent study to determine the planned net energy savings for CCEI for 2018-2020.

Savings Impact: See the Rhode Island Code Compliance Enhancement Initiative Attribution and Savings Study for the net savings impact for CCEI.

Study Name: 2017 Rhode Island Commercial Code Savings Analysis

Type of Study: Impact

Evaluation Conducted by: NBI

Date Evaluation Conducted: 2017

Evaluation Objective and High Level Findings:

The purpose of this study was to estimate the technical potential for commercial buildings relative to the commercial compliance baseline (see 2016 study). Energy modeling found that the average RI commercial building could attain annual electric savings of 0.73 kWh/sf and gas savings of 0.90 MMBtu/sf if it fully complied with the state's building energy code.

Programs to which the Results of the Study Apply:

RI Residential New Construction (Code Compliance Enhancement Initiative (CCEI))

Evaluation Recommendations included in the study:

It was recommended that the above energy savings technical potential figures be used to determine the CCEI's net savings (post-attribution) as part of National Grid RI's 2018-2020 plan filing (details below).

Component	Technical Potential (kBtu/sf)
Infiltration	0.03
Wall Insulation	0.21
Roof Insulation	0.93
Fenestration	0.86
Slab	0.04
LPD	0.88
Light Controls	0.40
Exterior Lighting	0.11
Cooling Efficiency	-0.02
Heating Efficiency	0.03
Fan Horsepower	0.03
Duct Leakage	0.03
Economizer	0.06
DHW	0.03
DCV	0.03
All Compliance Rates	3.38

Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:

The results from this study were adopted outright and used in a subsequent study to determine the planned net energy savings for CCEI for 2018-2020.

Savings Impact: See the 2017 Rhode Island Code Compliance Enhancement Initiative Attribution and Savings Study for the net savings impact for CCEI.

Study Name: 2017 Rhode Island Code Compliance Enhancement Initiative Attribution and Savings Study

Type of Study: Impact

Evaluation Conducted by: NMR

Date Evaluation Conducted: 2017

Evaluation Objective and High Level Findings:

The purpose of this study was to develop attribution factors and final claimable savings figures for the RI energy code technical support program (residential and commercial) for National Grid RI's 2018-2020 plan filing. The study found residential and commercial attribution factors of 23% and 46, respectively, which were used along with study results on average savings as well as construction activity projections to calculate the CCEI's projected savings from 2018-2020.

Programs to which the Results of the Study Apply:

RI Residential New Construction (Code Compliance Enhancement Initiative (CCEI))

Evaluation Recommendations included in the study:

It was recommended that the following energy savings technical potential figures be used as the CCEI's planned net savings (post-attribution) in the 2018-2020 plan filing (details below).

Annual Program Savings	Residential			Commercial		
	Compliance Savings (MMBTUs)	Compliance Savings (MMBTUs)	Compliance Savings (MMBTUs)	Compliance Savings (MMBTUs)	Electric Component (MWh)	Gas Component (Therms)
2018	1,433	1,161	1,161	1,161	250	3,091
2019	1,863	1,288	1,288	1,288	277	3,429
2020	2,352	1,344	1,344	1,344	289	3,579
3 year total	5,648	3,793	3,793	3,793	815	10,099

Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:

The results from this study were adopted outright and included in the 2018-2020 plan.

Savings Impact: See table above. Note that CCEI's planned savings reduced sharply compared to the previous planning cycle (2015-2017).

Study name: Analysis of Job Creation from 2016 Expenditures for Energy Efficiency in Rhode Island by National Grid

Type of Study: Economic Impact

Evaluation Conducted by: Peregrine Energy Group

Date Evaluation Conducted: 2017

Evaluation Objective and High Level Findings:

In order to quantify the number of direct workers involved, National Grid commissioned Peregrine Energy Group, Inc. (Peregrine) to conduct a study of the job impacts of National Grid's energy efficiency programs delivered to Rhode Island electricity and natural gas customers in 2016.

Peregrine determined that 702 full-time equivalent (FTE) employees had work in 2016 as a result of investments by National Grid in energy efficiency programs provided to its Rhode Island electricity and natural gas customers. Most of the jobs created as a result of energy efficiency investments were local because they were tied to installation of equipment and other materials. The study identified 923 companies and agencies involved in National Grid's 2016 energy efficiency programs, 82% of which were located in Rhode Island.

The study is designed to be conducted annually.

Programs to which the Results of the Study Apply: This is an overall indicator of economic impact, not applied to a specific program.

Evaluation Recommendations and Program Administrator Response: The evaluation study does not include recommendations.

Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:
N/A

Savings Impact: N/A

Study Name: The Cadmus Group, Inc, Ductless Mini-Split Heat Pump Impact Evaluation, 2016

Type of Study: Impact

Evaluation Conducted by: Cadmus Group

Date Evaluation Conducted: 2015-16

Evaluation Objective and High Level Findings:

The Massachusetts and Rhode Island Program Administrators (PAs) commissioned Cadmus and its subcontractors, Navigant and Tetra Tech, (the evaluation team) to conduct an in situ evaluation of ductless mini-split heat pumps (DMSHPs). The evaluation team initially planned to study 132 Massachusetts homes that participated in the COOL SMART Program. The PAs, however, extended the scope of work to include 20 Rhode Island homes that participated in the High Efficiency Heating and Cooling Rebate Program.

Programs to which the Results of the Study Apply:

Residential HVAC

Evaluation Recommendations included in the study:

The study found average savings values for different fuels, including fuel switching situations, based on the large sample of installed systems. The study found widely varying situations and behavior, which led to the following list of recommendations:

- Recommendation: The evaluation team recommends exploring ways to improve the PAs' existing lost opportunity program for DMSHPs, such as how best to encourage the installation of multiple DMSHP heads to better match existing zones and displace primary system operation. Although the EFLHs decreased from the values prescribed in the Massachusetts TRM, the study still finds that a modest level of savings are achievable by moving from a standard efficiency DMSHP to a higher efficiency DMSHP. Substantially more savings could be achieved (i.e., the top 25% of savings) if newly installed DMSHPs are operated more regularly and continuously by better matching and integrating them zonally with primary heating systems, through better configuration design and installation and contractor and customer education and training. For example, contractors would focus their design efforts on specifying the appropriate number and size of DMSHP heads to match and heat entire zone(s) rather than a single room. Customers would then be educated on how to properly set the set points for both their primary and DMSHP heating systems, which will depend on their primary fuel type and outdoor temperatures. Finally, establishing program incentives for the generally more efficient, cold climate heat pumps would lead to increased program savings.
- Recommendation: The evaluation team recommends exploring methods for targeting homes with electric resistance heating for DMSHP retrofits. DMSHPs will nearly always be less expensive to operate than electric resistance heat, as shown by the COP of DMSHPs remaining above 1.0 on average for nearly all outdoor temperatures. Even at very cold temperatures where some non-cold climate units approach a COP of 1.0, the

number of hours in this condition are very few. Prior to new activities, program and consumer cost-effectiveness would require review.

- Recommendation: The team recommends targeting propane-heated homes for DMSHPs. As Figure ES-6 and Figure ES-7 show DMSHPs always operate less expensively than propane heating systems. Prior to new activities, program and consumer cost-effectiveness and regulatory considerations for fuel switching would require review.
- Recommendation: The team recommends exploring methods for addressing oil-heated homes. To target these homes, homeowners should be educated to turn off a DMSHP during very cold outdoor conditions (below 8°F in 2015 and below 25°F in 2016), when an oil-fired system would operate less expensively (depending on energy prices and cold temperature COPs). This operating scheme, however, may not appeal to all customer types, as many may not wish to concern themselves about which heating system to operate and when. If oil prices increase against electric energy rates, the switchover temperature point for oil to DMSHP heat may move lower, allowing continual use of a DMSHP. Switchover points for all fuel comparisons will decrease as more efficient DMSHP units become available. Prior to new activities, program and consumer cost-effectiveness and regulatory considerations for fuel switching would require review.
- Recommendation: Based on large energy-usage differences in DMSHP-cooled homes and central air conditioner-cooled homes, the team recommends examining opportunities for a new construction measure to substitute DMSHPs for central air conditioners.

Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:

The study findings will be used in program design changes and savings calculations.

Savings Impact: The study findings will be used to calculate savings.

Study name: DNV-GL, Impact Evaluation of 2015 MA Commercial & Industrial Upstream Lighting Program, September 2017

Type of Study: Impact

Evaluation Conducted by: DNV-GL

Date Evaluation Conducted: 2016-17

Evaluation Objective and High Level Findings:

This study evaluated MA installations incentivized through the upstream lighting program to come up with updated electric savings values for the various upstream lighting measures. An RI study is leveraging projects completed by the Company's MA affiliate to reduce cost, while still meeting statistical reliability requirements. The MA study is providing revised savings values for various measures, some of which went down while others went up; the RI sample will inform RI-specific values when pooled with the MA sample.

Programs to which the Results of the Study Apply:

Large Commercial Electric Upstream Lighting

Evaluation Recommendations included in the study:

Table 7-1 shows the program's final realization rates by key product category. For measure categories 2, 3, and 4, realization rates were notably low. While category 1 had a high realization rate, this was driven in large part by underestimating TLED delta watt savings. For category 5, the high realization rate was driven by the observed hours of use being higher than the assumed hours of use.

Table 7-1. Final realization rates for the program by key product category

Savings Parameter	Energy - Category 1 TLEDs	Energy - Category 2 Stairwell kits	Energy - Category 3 Retrofit kits	Energy - Category 4 A-lines and Decoratives	Energy - Category 5 G24s	Energy - Categories 3, 4, 5 Combined
Gross Realization Rate (with in-storage adjustment)	195.20%	46.99%	51.38%	27.24%	111.87%	48.55%
Gross Realization Rate (without in-storage adj)	188.59%	45.72%	48.06%	25.92%	98.56%	44.84%

Table 7-2 shows the installation rates for all measure categories. We found these rates to be poor for all categories except category 1, TLEDs, which means that site auditors did not find a significant quantity of the products installed. Despite these poor installation rates, category 5 still saw some savings. Low installation rates occurred due to various factors including products still being in storage onsite, customers removing or returning defective products, products being

sent to alternate locations, or customers exchanging products for which there was no associated tracking information.

Table 7-2. Installation rates for all measure categories

Savings Parameter	Energy - Category 1 TLEDs	Energy - Category 2 Stairwell kits	Energy - Category 3 Retrofit kits	Energy - Category 4 A-lines and Decoratives	Energy - Category 5 G24s	Energy - Categories 3, 4, 5 Combined
Installation Rate (with in-storage adjustment)	91.95%	69.77%	62.24%	66.63%	62.91%	63.81%
Installation Rate (without in-storage adj)	89.78%	65.94%	58.56%	62.42%	56.74%	59.54%

The above results will be translated into revised savings estimates for each measure type within the upstream lighting program.

Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:

National Grid will use the MA draft study results in program planning and reporting for 2018.

Savings Impact: The study result will be used to adjust gross upstream lighting savings.

Study name: DNV-GL, Impact Evaluation of 2014 Custom HVAC Installations, August 2017

Type of Study: Impact

Evaluation Conducted by: DNV-GL

Date Evaluation Conducted: 2016-17

Evaluation Objective and High Level Findings:

This document summarizes the work performed by the DNV GL team, between 2016 and 2017 to quantify the actual energy and demand savings due to the installation of 88 custom heating, ventilation and air-conditioning (HVAC) measures installed through National Grid's 2012 (MA) and 2014 (RI) C&I New Construction and Major Renovation and C&I Large Retrofit programs.

The RI study leveraged projects completed by the Company's MA affiliate in the recent MA Custom HVAC study to reduce cost, while still meeting statistical reliability requirements.

The overall (MA+RI) realization rate for custom HVAC measures was found to be 78%. The relative precision for this estimate was found to be $\pm 7.6\%$ at the 90% level of confidence. The error ratio was found to be 0.37 and better than the estimate of 0.60 used in the sample design for this study. For the on-peak summer kW, the overall realization rate was 69%, with a relative precision of $\pm 14.6\%$ at an 80% confidence level. For on-peak winter kW, the realization rate was a bit lower, at 70% with a relative precision of $\pm 14.7\%$ at an 80% confidence level.

Programs to which the Results of the Study Apply:

Large Commercial Electric Custom HVAC

Evaluation Recommendations included in the study:

More Refined Savings Assumptions

The accuracy of the tracking savings calculations will improve with more refined assumptions. For example, one project calculated savings from a reduction in hours of use of exhaust fans in a hospital. The tracking analysis assumed almost all values for the exhaust fans were equal, other than the motor horsepower. This significantly altered the savings rate for each exhaust fan. The evaluation recommends that the program request a more refined analysis that incorporates the inherent differences of varying motor sizes and motor use cases.

Improve Baseline or Pre-Retrofit Documentation

For any future retrofit projects, DNV GL recommends National Grid to record ample pre-retrofit data. Several sites did not clearly document the pre-retrofit equipment operation or the basis for the base case in their project applications. For example, some technologies that use controls to change operations, such as ventilation control measures, economizers and others, are very common and the supporting documentation and baseline assumptions provided for HVAC control measures, were not as comprehensive as with other technologies. It is recommended that National Grid collect and document information on the actual HVAC system operations

such as damper positions, outside air ventilation levels, etc. for existing equipment undergoing controls improvements.

Conduct Pre-Installation Metering for More Retrofit Projects

Short term pre-installation metering could be used to confirm assumptions about pre-existing equipment for some retrofit projects, particularly control type projects. The evaluator may not be able to simulate pre-retrofit operating conditions; therefore, metering done by the implementation vendor prior to installation could improve confidence in the pre-retrofit assumptions.

Improve use of Post Inspection to Verify Measure Operation

On few occasions, evaluators identified sites in which the controls or equipment installed were not operational. Post inspections are generally occurring on all custom projects, but the effectiveness of the post inspection could be improved by observing and documenting operating conditions at the time of the inspection rather than only verifying if the measure was installed. It is recommended that National Grid continue to use more rigorous post-installation inspections to further build on the efforts made in this area.

Use of prescriptive calculation methodology should be reduced

DNV GL recommends National Grid reduce the use of prescriptive demand values for custom measures especially when the measure involves pump or fan motors. For example, prescriptive deemed savings value (TRM) for a VSD retrofit on a pump motor (kWh/hp) may not produce accurate savings estimates in a custom project; the pre- and post- conditions could vary significantly therefore, deviating from the TRM savings estimate.

Require Trend Data Acquisition

Stipulate in customer participation agreements that for sites receiving controls measures, either customer staff are to be trained or the controls contractor will be required to assist with subsequent EMS trending in the event customer is chosen as an evaluation site. It would be helpful to include in the contract specifically which trends should be made available to National Grid and evaluators for evaluation. The engineers developing the project scopes could specify the required trends. Consider the feasibility of configuring controls systems to allow remote access by evaluators to allow for data downloads.

Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:

National Grid will use the study results in program planning and reporting in 2018 for the Custom HVAC program.

Savings Impact: The study result will be used to adjust Custom HVAC realization rates.

Study name: DNV-GL, MA C&I Impact Evaluation of 2013 Custom Process Installations (August 2017 Draft)

Type of Study: Impact

Evaluation Conducted by: DNV-GL

Date Evaluation Conducted: 2015-16

Evaluation Objective and High Level Findings:

The objective of this impact evaluation is to provide verification or re-estimation of electric energy and demand savings estimates for a sample of custom electric projects through: Site-specific inspection, monitoring, and analysis.

The scope of work of this impact evaluation covered the 2013 Custom Process impact category, which include new equipment and/or control systems and strategies for which energy consumption and savings is primarily driven by a quantified non-weather load, such as tons of production or total hours of operation. The 2013-2015 Plan Massachusetts Technical Reference Manual for Estimating Savings from Energy Efficiency Measures defines this impact group as “New construction and/or retrofit projects for process system equipment and controls.” The same definition was used in all reference manuals published since.

The study provides the following key findings:

- Realization rates for annual electric energy savings
- Realization rates for summer on-peak demand savings
- Realization rates for winter on-peak demand savings

Programs to which the Results of the Study Apply:

Large Commercial electric Custom Process

Evaluation Recommendations included in the study:

The realization results from this study should be used prospectively to calculate the adjusted gross savings achieved by projects in the Custom Process impact category.

Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:

National Grid will use the study results in program planning and reporting in 2018 for the Custom Process project type.

Savings Impact: The study result will be used to adjust realization rates for Custom Process projects.

Study name: TetraTech, 2016 Commercial and Industrial Programs Free-Ridership and Spillover Study, September 2017

Type of Study: Net to Gross

Evaluation Conducted by: TetraTech

Date Evaluation Conducted: 2017

Evaluation Objective and High Level Findings:

The purpose of this study was to assess program free-ridership and spillover for the C&I programs that would applied to their relevant programs prospectively.

Programs to which the Results of the Study Apply:

Large Commercial Gas: New Construction (NC), Retrofit, Small Business

Large Commercial Electric: NC, Retrofit, Small Business, Upstream lighting

Evaluation Recommendations included in the study:

Revised Free-ridership and spillover values were provided for the programs, separated by custom and prescriptive programs, as in the following tables summarized from the report:

2016 C&I Electric Free-Ridership and Spillover Results by Program and Program Type

Program	Program Type	Free-ridership Rate	Participant "Like" Spillover Rate	Nonparticipant "Like" Spillover Rate	Net-to-Gross Rate
Bright Opportunities	Prescriptive	5.2%	3.6%	NA	98.4%
	Total	5.2%	3.6%	NA	98.4%
Design 2000plus	Custom	8.5%	2.5%	0.0%	94.0%
	Prescriptive	29.1%	0.0%	3.0%	73.9%
	Total	18.7%	1.3%	1.5%	84.1%
Energy Initiative	Custom	15.8%	0.0%	0.0%	84.2%
	Prescriptive	10.0%	4.3%	5.5%	99.8%
	Total	13.2%	1.9%	2.4%	91.2%
Small Business	Prescriptive	3.2%	0.3%	0.0%	97.1%
	Total	3.2%	0.3%	0.0%	97.1%
Total	Custom	14.6%	0.4%	0.0%	85.8%
	Prescriptive	8.9%	2.9%	2.4%	96.4%
	Total	11.0%	2.0%	1.5%	92.5%

2016 C&I Natural Gas Free-Ridership and Spillover Results by Program and Program Type

Program	Program Type	Free-ridership Rate	Participant Spillover Rate	Nonparticipant "Like" Spillover Rate	Net-to-Gross Rate
Commercial New Construction	Custom	0.0%	0.0%	0.0%	100.0%
	Prescriptive	11.6%	0.0%	0.1%	88.5%
	Total	3.4%	0.0%	0.0%	96.6%
Large Commercial Retrofit	Custom	11.1%	0.0%	0.0%	88.9%
	Prescriptive	0.2%	0.0%	0.0%	99.8%
	Total	8.7%	0.0%	0.0%	91.3%
Small Business	Prescriptive	1.4%	0.0%	0.0%	98.6%
	Total	1.4%	0.0%	0.0%	98.6%
Total	Custom	9.2%	0.0%	0.0%	90.8%
	Prescriptive	2.7%	0.0%	0.0%	97.4%
	Total	7.6%	0.0%	0.0%	92.4%

Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:

The Company implemented the study results in the 2018 plan.

Savings Impact: The study result will be used as part of 2018 reporting.

Study name: Massachusetts C&I Evaluation Contract Project Summary: Steam Trap Evaluation Phase 2

Type of Study: Impact

Evaluation Conducted by: DNV-GL

Date Evaluation Conducted: 2016-17

Evaluation Objective and High Level Findings:

This study assessed savings estimates for both custom and deemed steam traps. The evaluator created a revised custom steam trap estimation tool that slightly modified savings estimates. The evaluator provided a revised deemed savings value of 12.2 MMBTU/yr of gas savings, which replaced the previous value of 25.7 MMBTU/yr.

Programs to which the Results of the Study Apply:

Large Commercial Gas: retrofit, small business

Evaluation Recommendations included in the study:

Recommendation 1: The PAs should use the revised custom savings equation and tool for projects installed in 2017 and moving forward.

Recommendation 2: The PAs should update the deemed savings value for prescriptive trap replacements from 25.7 to 12.2 MMBtu/year and should apply it both retrospectively to 2016 prescriptive projects and prospectively for 2017 and going forward.

Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:

The recommendations from the study were implemented as part of the 2018 plan, and will be used for 2018 reporting.

Savings Impact: Custom steam trap savings values are expected to be slightly lower, while prescriptive steam trap savings are reduced by more than 50%.

Study name: DNV-GL, Gas Boiler Market Characterization Study Phase II: Final Report, March 2017

Type of Study: Baseline

Evaluation Conducted by: DNV-GL

Date Evaluation Conducted: 2015-17

Evaluation Objective and High Level Findings:

The overall goal of the study is to quantify the evolving baseline for commercial and industrial (C&I) boilers. DNV GL and NMR Group are conducting this study for the Massachusetts Large Commercial and Industrial Evaluation contract (LCIEC) operated by the Massachusetts program administrators (PAs). Phase II of the study consists of five key tasks:

Task 1: Seek Boiler Manufacturer Input/Comment on Phase I Final Report (completed July 2015)

Task 2: Comparative Research on Condensing Gas Boiler Programs in the Northeast Region (completed June 2015)

Task 3: Initiate Boiler Product Line Mapping (completed June 2015)

Task 4: Provide Overview of US Department of Energy (DOE) Notice of Proposed Rulemaking (NOPR) for Commercial Boiler Standards (completed May 2016)

Task 5: Conduct Open-Dialog Massachusetts Boiler Roundtable

This study defines small C&I boilers as those between 90 and 2,000 MBH (thousand British thermal units per hour) in size that are installed at a business or other nonresidential location.

Programs to which the Results of the Study Apply:

Large Commercial Gas New Construction

Evaluation Recommendations included in the study:

Raise the baseline assumption from 80% to 85% efficiency for boilers less than 2,000 MBH in size. This study estimates that condensing models represent about 74% of non-residential boilers sold in Massachusetts, which is supported by the ongoing existing building market characterization study that estimates that approximately 70% of gas hot water boilers installed since 2009 are high efficiency models. In addition, manufacturers anticipate that sales of condensing models will continue growing in the future. The number of condensing gas boiler rebates issued annually by the Massachusetts PA non-residential prescriptive program has been increasing and a scenario analysis indicates there may be several hundred or more condensing boilers sold each year in Massachusetts that do not receive program rebates. Over the course of this study, manufacturers noted a trend towards offering higher efficiency products, and some are already re-tooling to meet mid-range efficiency ratings which they consider to begin at 85%

Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:

The Company adopted the baseline change in the 2018 program plan.

Savings Impact: The study results have been applied.

Study name: DNV-GL, MA45 Prescriptive Programmable Thermostats, March 2017.

Type of Study: Impact

Evaluation Conducted by: DNV-GL

Date Evaluation Conducted: 2016-17

Evaluation Objective and High Level Findings:

The purpose of Project 45 was to determine an accurate natural gas savings estimate associated with programmable thermostats (PTs) installed in commercial and industrial (C&I) buildings in Massachusetts. The results of this study were inconclusive. We were unable to estimate a statistically significant value for programmable thermostat natural gas savings using the methods detailed below. However, the results of Project 45 do suggest that PTs installed in C&I buildings save some amount of natural gas. For this reason, we recommend that the program continue to use the conservative deemed value of 32 therms/yr per prescriptive programmable thermostat.

Programs to which the Results of the Study Apply:

Large Commercial Gas: Retrofit, Small Business

Evaluation Recommendations included in the study:

Given the lack of a persuasive result for this measure, we recommend that the program pursue the following options:

1. Continue to offer this measure at the current deemed value of 32 therms per thermostat.
2. Shift resources towards smart web-enable thermostat or mini-EMS systems, both for energy efficiency and electrical demand response.

We also include the following suggestions for future program consideration.

1. Consider the cost-effectiveness of this offering using the current 32 therms per thermostat savings value.
2. Revisit savings potential if gas interval data becomes available or gas non-intrusive load monitoring (NILM) is pursued as part of a larger evaluation.

Explain Whether or Not National Grid Decided to Adopt Recommendations from the Study:

The Company adopted the programmable thermostat deemed savings value in the 2018 program plan.

Savings Impact: C&I Programmable thermostat deemed savings value changed from 77 therms/yr to 32 therms/yr.

2018 Rhode Island Test Description

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Introduction

This section has been prepared pursuant to Section 1.2(B) of the Least Cost Procurement Standards (Standards) for the procurement of energy efficiency resources, approved by the Rhode Island PUC in Docket 4684.

In previous Annual Plans, the Company assessed the cost-effectiveness of measures, programs, and portfolios according to the Total Resource Cost (TRC) Test. The revised Standards set forth new requirements for a cost-effectiveness test called the Rhode Island Benefit Cost Test (RI Test), which “more fully reflects the policy objectives of the State with regard to energy, its costs, benefits, and environmental and societal impacts.” The change to the RI Test is a positive development for energy efficiency. Accounting for all costs and benefits associated with energy efficiency provides for a more holistic view of its impacts to electric and gas customers, the environment, and the economy. The 2018 Annual Plan includes two new benefits for cost-effectiveness screening that were approved as part of the 2018-2020 Three-Year Plan in Docket 4684. These benefits include: non-embedded greenhouse gas reductions (i.e., the value of reducing greenhouse gas emissions that is not already included in the baseline avoided costs) and economic development impacts.

The source for many of the avoided cost value components is “Avoided Energy Supply Costs in New England: 2015 Report,” (2015 AESC Study) prepared by Tabors Caramanis and Rudkevich (TCR) for the Avoided Energy Supply Component Study Group, April 2015.¹ This report was sponsored by all the electric and gas efficiency program administrators in New England and is designed to be used for cost effectiveness screening in 2016 through 2018.

It is the intent of National Grid that the RI Test as described here will be in place until the next review of the Standards in advance of the 2020-2022 Least Cost Procurement Plan. However, additional benefits and costs may be added in future Annual Plans and the component values may be updated over the course of the three year period based on the availability of new study results. Future updates to inputs and values will be included in future Annual Plan filings.

As specified in the Standards,

¹ The report is available online at: <http://ma-eeac.org/wordpress/wp-content/uploads/2015-Regional-Avoided-Cost-Study-Report1.pdf>. This study forecasts avoided costs for three years, compared to prior studies which developed avoided costs applicable to a two-year period. In the fall of 2016, TCR prepared a limited update of Appendices B (Avoided Electricity Cost Results), C (Avoided Natural Gas Cost Results), and D (Avoided Electricity Cost Results) in the report for Maine, New Hampshire, Rhode Island, and Vermont based on new estimates for six categories of inputs starting in 2017 that the Company applied to the 2018-2020 Three-Year Plan and this 2018 Annual Plan.

- i. The distribution company shall assess the cost-effectiveness of measures, programs, and portfolios according to a benefit-cost test that builds on the Total Resource Cost Test approved by the Public Utilities Commission (PUC) in Docket 4443, but that more fully reflects the policy objectives of the State with regard to energy, its costs, benefits, and environmental and societal impacts. The distribution company shall, after consultation with the Council, propose the specific benefits and costs to be reported, and factors to be included, in the Rhode Island Benefit Cost Test (RI Test) and include them in Energy Efficiency Plans. These benefits should include resource impacts, non-energy impacts, distribution system impacts, economic development impacts, and the value of greenhouse gas reductions, as described below. The accrual of specific non-energy impacts to only certain programs or technologies, such as income-eligible programs or combined heat and power, may be considered.
- ii. The distribution company shall apply the following principles when developing the RI Test:
 - a. **Efficiency as a Resource.** EE is one of many resources that can be deployed to meet customers' needs. It should, therefore, be compared with both supply-side and demand-side alternative energy resources in a consistent and comprehensive manner.
 - b. **Energy Policy Goals.** Rhode Island's cost-effectiveness test should account for its applicable policy goals, as articulated in legislation, PUC orders, regulations, guidelines, and other policy directives.
 - c. **Hard-to-Quantify Impacts.** Efficiency assessment practices should account for all relevant, important impacts, even those that are difficult to quantify and monetize.
 - d. **Symmetry.** Efficiency assessment practices should be symmetrical, for example, by including both costs and benefits for each relevant type of impact.
 - e. **Forward Looking.** Analysis of the impacts of efficiency investments should be forward-looking, capturing the difference between costs and benefits that would occur over the life of efficiency measures with those that would occur absent the efficiency investments. Sunk costs and benefits are not relevant to a cost-effectiveness analysis.

- f. **Transparency.** Efficiency assessment practices should be completely transparent, and should fully document and reveal all relevant inputs, assumptions, methodologies, and results.
- iii. With respect to the value of greenhouse gas reductions, the RI Test shall include the costs of CO₂ mitigation as they are imposed and are projected to be imposed by the Regional Greenhouse Gas Initiative. The RI Test shall also include any other utility system costs associated with reasonably anticipated future greenhouse gas reduction requirements at the state, regional, or federal level for both electric and gas programs. A comparable benefit for greenhouse gas reduction resulting from natural gas or delivered fuel energy efficiency or displacement may be considered. The RI Test may include the value of greenhouse gas reduction not embedded in any of the above. The RI Test may also include the costs and benefits of other emissions and their generation or reduction through Least Cost Procurement.
- iv. Benefits and costs that are projected to occur over the term of the Energy Efficiency Plans shall be stated in present value terms in the RI Test calculation using a discount rate that appropriately reflects the risks of the investment of customer funds in energy efficiency; in other words, a discount rate that indicates that energy efficiency is a low-risk resource in terms of cost of capital risk, project risk, and portfolio risk. The discount rate shall be reviewed and updated in the Energy Efficiency Plans, as appropriate, to ensure that the applied discount rate is based on the most recent information available.
- v. The distribution company shall provide a discussion of the carbon impacts efficiency and reliability investment plans will create, whether captured as benefits or not.

The Rhode Island Test Overview

The RI Test compares the present value of a stream of **net benefits** associated with the **net savings** of an energy efficiency measure or program **over the life** of that measure or program to the total costs necessary to implement the measure or program. The RI Test may be applied to any energy efficiency program independent of the primary fuel or resource the effort focuses on.

The RI Test captures the value created by efficiency measures installed in a particular program year over the useful life of the measure. The measure life is based on the technical life of the measure modified to reflect expected measure persistence. Because the RI Test captures the value associated with a stream of benefits over a

period of time, the benefits from a measure are present valued so that costs and benefits may be compared.

The benefits calculated in the RI Test are the avoided resource supply and delivery costs, valued at marginal cost for the periods when there is a load reduction, as well as the monetized value of non-resource savings.

The program costs are those paid by both the utility and by participants plus the increase in supply costs for any period when load is increased. All equipment, installation, O&M, removal, evaluation and administration costs are included.

All savings included in the value calculations are net savings. The expected net savings are typically an engineering estimate of savings modified to reflect the actual realization of savings based on evaluation studies. The expected net savings also reflect market effects due to the program. The RI Test captures the combined effects of a program on both the participating customers and those not participating in a program. From a resource acquisition perspective, if the program induces participants or non-participants to acquire energy efficiency devices without program expenditures, these effects—known as spillover—should be attributed as program benefits in the RI Test. The costs incurred by customers to acquire equipment on their own are also counted as costs in the RI Test.

On the other hand, if a customer accepts program funds to implement an energy efficiency measure they would have done anyway, the savings associated with this practice is known as “free ridership.” From the perspective of resource acquisition through utility programs, it is important to distinguish whether the customer would have implemented the efficiency measure without the program. Therefore, savings associated with free-ridership are deducted from program savings.²

The benefits and costs considered in Rhode Island are detailed in the next section.

Description of Program Benefits and Costs

The following benefits and costs are included in the RI Test. They are listed here with details after.

- 1) Electric Energy Benefits
- 2) Electric Generation Capacity Benefits
- 3) Electric Transmission Capacity and Distribution Capacity Benefits

² Both free-ridership and spillover have been determined from surveys of program participants, non-participants, and other market actors

- 4) Natural Gas Benefits
- 5) Fuel Benefits (including the value of delivered fuel savings from programs that influence delivered fuel consumption)
- 6) Water and Sewer Benefits
- 7) Non-Energy impacts
- 8) Price Effects
- 9) Combined Heat and Power Benefits
- 10) Non-embedded Greenhouse Gas Reduction Benefits
- 11) Economic Development Benefits
- 12) Utility Costs
- 13) Participant Costs

All of the benefits are monetized benefits directly associated with the installation of electricity or natural gas efficiency projects.

1) Electric Energy Benefits

Avoided electric energy costs are appropriate benefits for inclusion in the RI Test. When consumers do not have to purchase electric energy because of their investment in energy efficiency, an avoided resource benefit is created.³

Electric energy savings are valued using the avoided electric energy costs developed in the 2015 AESC Study Update, Appendix B.⁴ The values in the AESC Study represent wholesale electric energy commodity costs that are avoided when generators produce less electricity because of energy efficiency.⁵ They include pool transmission losses incurred from the generator to the point of delivery to the distribution companies, the costs of renewable energy credits borne by generators, and a wholesale risk premium that captures market risk factors typically recovered by generators in their pricing. The avoided energy costs also internalize the expected cost of complying with current or reasonably anticipated future regional or federal greenhouse gas reduction requirements which are borne by generators and passed through in wholesale costs.

³ For strategic electrification measures, the RI Test counts the incremental electric heating load as a negative benefit.

⁴ The values for Rhode Island have also been included as Table E-9 in Appendix 5.

⁵ Avoided costs may be viewed as a proxy for market costs. However, avoided costs may be different from wholesale market spot costs because avoided costs are based on simulation of market conditions, as opposed to real-time conditions. They may be different from standard offer commodity costs because of time lags and differing opinions on certain key assumptions, such as short term fuel costs.

The avoided energy costs in the 2015 AESC Study Update are provided in four different costing periods consistent with ISO-NE definitions. Net energy savings are split up into these periods in the value calculation. The time periods are defined as follows:

- Winter Peak: October – May, 7:00 a.m. – 11:00 p.m., weekdays excluding holidays.
- Winter Off-Peak: October – May; 11:00 p.m. – 7:00 a.m., weekdays. Also including all weekends and ISO defined holidays.
- Summer Peak: June – September, 7:00 a.m. – 11:00 p.m., weekdays excluding holidays.
- Summer Off-Peak: June – September; 11:00 p.m. – 7:00 a.m., weekdays. Also including all weekends and ISO defined holidays.

In the benefits calculation, energy savings are grossed up using factors that represent transmission and distribution losses because a reduction in energy use at the customer means that amount of energy does not have to be generated, plus the extra generation that is needed to cover the losses that occur in the delivery of that energy is not needed.

Net energy savings for a program (or measures aggregated within a program) are allocated to each one of these time periods and multiplied by the appropriate avoided energy value.⁶ The dollar benefits are then grossed up using the appropriate loss factors representing losses from the ISO delivery point to the end use customer.

- Summer Peak Energy Benefit (\$) = kWh * Energy%_{SummerPk} * SummerPk\$/kWh_(@Life) * (1 + %Losses_{SumPk-kWh})
- Summer OffPeak Energy Benefit (\$) = kWh * Energy%_{SummerOffPk} * SummerOffPk\$/kWh_(@Life) * (1 + %Losses_{SummerOffPk-kWh})
- Winter Peak Energy Benefit (\$) = kWh * Energy%_{WinterPk} * WinterPk\$/kWh_(@Life) * (1 + %Losses_{WinterPk-kWh})
- Winter OffPeak Energy Benefit (\$) = kWh * Energy%_{WinterOffPk} * WinterOffPk\$/kWh_(@Life) * (1 + %Losses_{WinterOffPk-kWh})

⁶ The notation “@Life” in the equation for value for this and other value components is an indication that the avoided value component for each benefit (e.g., electric energy, capacity, natural gas, etc.) is the cumulative net present value (in 2018 dollars) of avoided costs for each year of the planning horizon from the base year over the life of the measure. For example, the avoided value component for a measure with an expected life of ten years for any given benefit component is the sum of the net present value of the annual avoided costs for that component in Year 1, Year 2, Year 3, etc., through Year 10.

2) Electric Generation Capacity Benefits

Avoided electric generation capacity values are appropriate for inclusion in the RI Test. When generators do not have to build new generation facilities or when construction can be deferred because of consumers' investments in energy efficiency, an avoided resource benefit is created. In the New England capacity market, capacity benefits accrue because demand reduction reduces ISO-NE's installed capacity requirement. The capacity requirement is based on load's contribution to the system peak, which, for ISO-NE, is the summer peak. Therefore, capacity benefits accrue only from summer peak demand reduction; there is currently no winter generation capacity benefit.

Demand savings created through program efforts are valued using the avoided capacity values from the 2015 AESC Study Update, Appendix B.⁷ The values contained in the study reflect the avoided cost of peaking capacity, and incorporate a reserve margin and losses incurred from the generator to the point of delivery to the distribution companies. ISO-New England reserve margins are incorporated into the capacity values, since energy efficiency avoids the back-up reserves for that generation as well as the generation itself. A loss factor representing losses from the ISO delivery point to the end-use customer is used as a multiplier, since those losses are not included in the avoided costs. Demand savings are calculated to be coincident with the ISO-NE definition of peak.

The dollar value of benefits are therefore calculated as:

- $\text{Generation Capacity Benefit}(\$) = \text{kW}_{\text{Summer}} * \text{GenerationCapValue}\$/\text{kW}_{(\text{@Life})} * (1 + \% \text{Losses}_{\text{SummerkW}})$

3) Electric Transmission Capacity and Distribution Capacity Benefits

Avoided transmission and distribution capacity values are appropriate for inclusion in the RI Test. When transmission and distribution facilities do not have to be built or can be deferred because of lower loads as a result of consumers' investments in energy efficiency, an avoided resource benefit is created.

Electric transmission capacity and distribution capacity benefits are valued in the RI Test using avoided transmission and distribution capacity values calculated in a spreadsheet tool that was developed in 2005 by ICF International, Inc., the consultant that performed the biennial avoided cost study for New England's energy efficiency program administrators in that year. The tool calculates an annualized value of statewide avoided

⁷ The values for Rhode Island have also been included as Table E-9 in Appendix 5

transmission and distribution capacity values from company-specific inputs of historic and projected capital expenditures and loads, as well as a carrying charge calculated from applicable tax rates and Federal Energy Regulatory Commission (FERC) Form 1 accounting data.

Capacity loss factors are applied to the avoided T&D capacity costs to account for local transmission and distribution losses from the point of delivery to the distribution company's system to the ultimate customer's facility. Thus, losses will be accounted for from the generator to the end use customer.

T&D benefits could be allocated to summer and winter periods, depending on the relation between summer and winter peaks on the local system. However, the Company's system is summer peaking. Therefore, the T&D benefits will be exclusively associated with summer demand reduction and the dollar value will be calculated as follows:

- Transmission Benefit (\$) = $(kW_{\text{Summer}} * \text{Trans}\$/kW_{(\text{@Life})} * [1 + (\text{Losses}_{\text{SumkWTrans}})])$
- Distribution Benefit (\$) = $(kW_{\text{Summer}} * \text{Dist}\$/kW_{\text{Life}(\text{@Life})} * [1 + (\text{Losses}_{\text{SumkWDist}})])$

4) Natural Gas Benefits

Avoided natural gas consumption is appropriate for inclusion in the RI Test. When a project in which consumers have invested saves natural gas, an avoided resource benefit is created.

Natural gas benefits in the RI Test will be valued using avoided natural gas values from the 2015 AESC Study Update, Appendix C.⁸ These costs include commodity, transportation, and retail delivery charges that would be avoided by fuels not consumed by end users.

The AESC Study Report presents avoided natural gas value components into end-use categories to match with individual program characteristics. The natural gas categories are:

- Commercial and industrial, non-heating. This assumes savings are constant throughout the year and averages monthly natural gas values over 12 months.
- Commercial and industrial, heating. Averages the monthly values for the months of November through March.

⁸ The values for Rhode Island have also been included as Table G-9 in Appendix 5

- Residential heating. Averages the monthly values for the months of November through March. As these months have the highest natural gas values, by averaging over a fewer number of months, natural gas savings in this category typically have the highest value.
- Domestic hot water. This assumes savings are constant throughout the year and averages monthly natural gas values over 12 months.

Using each of these end-use value components, the dollar value of fuel benefits is calculated as:

- Natural Gas Benefits (\$) = MMBtu Gas Savings * (Gas\$/MMBTU_(EndUseCategory,@Life) + Greenhouse Gas \$/MMBTU_(@Life))

5) Delivered Fuel Benefits

Avoided delivered fuel costs (natural gas, propane, or fuel oil) are appropriate for inclusion in the RI Test. When a project in which consumers have invested saves fuel an avoided resource benefit is created.

Fuel benefits in the RI Test are valued using avoided fuel values from the 2015 AESC Study, Appendix D. The fuel oil categories are Residential #2, Commercial #2, Commercial #4, and Commercial and Industrial #6.

Using each of these end-use value components, the dollar value of fuel benefits is calculated as:

- Fuel Benefits (\$) = MMBTU_Fuel Savings * Fuel\$/MMBTU_(EndUseCategory,@Life)

6) Water and Sewer Benefits

Water savings created from program efforts should be valued and included in the RI Test. Water savings can be valued using avoided water and sewer values that are based on average water and sewer rates in Rhode Island. While there are no specific water efficiency measures, when a project in which consumers have invested to save electricity or fuel also affects water consumption—for example, a cooling tower project that reduces makeup water needed—a resource benefit is created. Depending on the project and metering configuration, changes in water consumption may also affect sewerage billings.

Water and sewerage rates were determined from an August 2014 internet survey of rates posted by the City of Providence⁹ and the Narragansett Bay Commission¹⁰.

Water and sewer benefits are counted for all projects, where appropriate, and calculated as follows:

- Water and Sewerage Benefits (\$) = Water and/or Sewerage Savings * Water and/or Sewer \$/Gal_(@Life)

7) Non-Energy Impacts

Other quantifiable non-resource or non-energy impacts may be created as a direct result of Least Cost Procurement efforts and, are therefore appropriate for inclusion in the RI Test. Non-energy impacts are typically associated with the number of measures installed, rather than the energy consumption of the equipment. They may be positive or negative. They may be one time benefits or recur annually. These effects will be included when they are a direct result of the measure and when they are quantifiable and avoidable.

The specific values of non-energy impacts used in the 2018 Annual Plan for prescriptive measures are documented in the 2018 RI Technical Reference Manual. Non-energy impacts may include – but are not limited to – labor, material, facility use, health and safety, materials handling, national security, property values, and transportation. For income-eligible measures, non-energy impacts also include the impacts of having lower energy bills to pay, such as reduced arrearages or avoided utility shut off costs. Non-energy impacts for Commercial and Industrial custom measures are counted when supported by site specific engineering calculations or other analyses.

The dollar value of non-resource benefits will be calculated as follows

- One-time Non-energy impacts (\$) = Non-energy impact (\$)/unit * Number of units
- Annual Non-energy impacts (\$) = Non-energy impact (\$)/unit * Number of units * Present Worth Factor_(@Life)

⁹ Water Rates.” Providence Water Supply Board. 2014.

<<http://www.provwater.com/depts/cs/billrates.htm>>

¹⁰ “Rates.” Narragansett Bay Commission. 2014.

<<http://www.narrabay.com/en/Customer%20Service/Rates.aspx>>

8) Price Effects

The Demand-Reduction-Induced Price Effect (DRIPE) is the reduction in prices in energy and capacity markets resulting from the reduction in need for energy and/or capacity due to efficiency and/or demand response programs. Consumers' investments in energy efficiency avoid both marginal energy production and capital investments, but also lead to structural changes in the market due to lower demand. Over a period of time, the market adjusts to lower demand, but until that time the reduced demand leads to a reduction in the market price of electricity. This is the observed in the New England market when ISO-New England activates its price response programs. When this price effect is a result of consumers' investments in energy efficiency, it is appropriate to include it in the RI Test.

DRIPE effects are very small when expressed in terms of an impact on market prices, i.e., reductions of a fraction of a percent. However, the DRIPE impacts are significant when expressed in absolute dollar terms over all the kWh transacted in the market. Very small impacts on market prices, when applied to all energy and capacity being purchased in the market, translate into large absolute dollar amounts.

DRIPE values developed for energy efficiency installations in 2017 from the 2015 AESC Study Update are used in the RI Test. The price effects are expressed as \$/kWh for each of the four energy costing periods, \$/kW for capacity, and \$/MMBtu for natural gas. In addition, there are cross fuel effects that are counted for when natural gas energy efficiency affects the price of electricity. For example, homes and generators compete for natural gas in winter. Scarcity of natural gas for generation may drive up the cost of electricity. Therefore, reduction in natural gas consumption due to energy efficiency may cause a price effect for electricity. (Even though the price effect is in electricity, that DRIPE benefit is converted to \$/MMBtu so that it can be attributed to the gas savings that create the effect.) The DRIPE benefit is calculated as:

- Summer Peak Energy DRIPE Benefit (\$) = kWh * Energy%_{SumPk} * (SummerPkDRIPE\$/kWh_(@Life+ElectricGasDRIPE\$/kWh) * (1 + %Losses_{SummerPk-kWh})
- Summer OffPeak Energy DRIPE Benefit (\$) = kWh * Energy%_{SumOffPk} * (SumOffPkDRIPE\$/kWh_(@Life +ElectricGasDRIPE\$/kWh) * (1 + %Losses_{SummerOffPk-kWh})
- Winter Peak Energy DRIPE Benefit (\$) = kWh * Energy%_{WinterPk} * (WinterPkDRIPE\$/kWh_(@Life+ElectricGasDRIPE\$/kWh) * (1 + %Losses_{WinterPk-kWh})
- Winter OffPeak Energy DRIPE Benefit (\$) = kWh * Energy%_{WinOffPk} * (WinterOffPkDRIPE\$/kWh_(@Life+ElectricGasDRIPE\$/kWh) * (1 + %Losses_{WinterOffPk-kWh})

- Generation Capacity DRIPE Benefit(\$) $= kW_{\text{Summer}} * CapDRIPEValue\$/kW_{(@Life)} * (1 + \%Losses_{\text{Summer}kW})$
- Natural Gas DRIPE Benefit (\$) = $MMBTU_{\text{Fuel Savings}} * (GasDRIPEValue\$/MMBTU_{(@Life)} + GasElectricDRIPE\$/MMBtu)$

9) CHP Benefits

CHP Benefits are assessed consistently with the RI Test and benefits described above. Additionally, R.I.Gen.Laws §39-1-27.7(c) (6) (iii) directs the Company to support the development of combined heat and power (CHP). The law requires that the following criteria be factored into the Company's CHP plan: (i) economic development benefits in Rhode Island; (ii) energy and cost savings for customers; (iii) energy supply costs; (iv) greenhouse gas emissions standards and air quality benefits; and (v) system reliability benefits.¹¹ Of these, energy and cost savings and energy supply costs are captured in the energy benefits described above. The other three benefits – economic development, greenhouse gas, and system reliability benefits – are described here.

Economic Development

For all CHP projects, net economic development benefits will be counted as benefits. The rate of economic development benefit will be \$0.80 of lifetime gross state product increase per dollar of program investment, based on the report, "Macroeconomic Impacts of Rhode Island Energy Efficiency Investments: REMI Analysis of National Grid's Energy Efficiency Programs, prepare by National Grid in August 2014, as an update to the 2009 study "Energy Efficiency in Rhode Island: Engine of Economic Growth," prepared by Environment Northeast. The \$0.80 multiplier reflects the present value of lifetime state gross domestic product (GDP) effects of program and participant spending that creates jobs in construction and other industries as the project is planned, and equipment is purchased and installed. Therefore, the CHP Economic Development benefits will be calculated as:

- Program and participant spending(\$) x \$0.80

Greenhouse gas reduction benefits

For all CHP projects, greenhouse gas mitigation and air quality benefits will be counted as benefits to the extent they are not already captured in the BCR screening values and to the extent that usable emissions data is available. The emissions profile of the CHP site facility prior to the installation of the retrofit (most likely a combination of grid supplied generation for electricity and an on-site boiler for thermal needs) will be compared to the emissions post-retrofit (most likely the CHP unit alone). The change in

¹¹ See R.I. Gen.Laws § 39-1-27.7(c) (6) (iii).

emissions in tons will be multiplied by a value of \$/ton for each pollutant and the values will be summed over all pollutants and counted as a benefit in the benefit/cost calculation. This method is contingent on having emissions data for all pollutants. This information is often difficult to come by; for example, ISO-New England annually publishes emissions per kWh for only SO_x, NO_x, and CO₂. Similarly, the amount of emissions for all pollutants associated with a particular CHP unit is not always provided.

Value from mitigation of CO₂ both embedded and non-embedded is already embedded in avoided energy costs in benefit-cost analysis.

System Reliability

If a CHP project is proposed in a system reliability target area, the system reliability benefits from deferring a distribution system upgrade would be captured in the System Reliability Procurement report. In the context of CHP located elsewhere in the state, system reliability benefits are the local distribution benefits created by the introduction of the CHP unit in the local area. Notably, CHP projects do not produce the same level of deferred distribution investment savings described in Section (3) above as traditional energy efficiency.¹² Accordingly, the distribution benefits are modified as follows:

- For CHP systems of less than 1 MW net capacity, the distribution deferral benefit value estimated by the Company based on system wide averages will be multiplied by 0.75 to incorporate an estimate of the reliability experience of discrete deployment of CHP units compared with end-use reduction efficiency measures which are spread across the state;¹³
- For CHP systems equal to or greater than 1 MW net capacity, the distribution benefit will consider location-specific distribution benefits, as opposed to average system-wide benefits. The results of this analysis will replace the

¹² With traditional energy efficiency projects, the installed measures permanently reduce load on the electric distribution system and, therefore, reduce the need to make distribution investments. CHP projects may not result in similar deferred distribution investment savings. A CHP unit may not be available at all peak times, and, absent any contractual or mechanical modification to ensure that the load does not reappear, the Company will still need to design and maintain the distribution system for when that unit goes off line during a peak hour on a peak day. This is particularly significant with larger CHP projects, in which a single host customer represents a significant percentage of the total load on a feeder. With multiple smaller units, some level of savings is possible, but these units are still not likely to produce distribution benefits in the same manner as traditional energy efficiency.

¹³ As explained in footnote 12, *supra*, while multiple small CHP units may produce some level of savings, these units are still not likely to produce distribution benefits in the same manner as traditional energy efficiency. Therefore, the 0.75 factor is adopted as a planning assumption to represent the contingency that, when a single CHP unit on a feeder fails to perform, the load reappears on the system. As more CHP units, particularly smaller units, are deployed in the state, the diversity of operation may allow the adjustment factor to be increased. The Company intends to review this planning assumption based on actual experience for future EE Program Plan filings.

- adjusted 0.75 of average system-wide distribution benefit described for CHP projects of less than 1 MW. This may entail a detailed engineering analysis performed by the Company, and additional costs. This consideration will have two parts: 1) identification of foreseeable investments that the CHP installation could potentially help defer, and their value; and 2) whether the unit will be sufficiently reliable, or firmed through the provision of physical assurance by the customer, to enable such savings to be realized;
- For CHP projects greater of 1 net MW or greater, gas system benefits not paid out as incentives to the Customer via the AGT incentive or gas service contract terms will be counted as benefits.¹⁴

10) Non-embedded Greenhouse Gas Reduction Benefits

In accordance with Section 1.2(B)(iii) of the Standards, the RI Test now includes the value of greenhouse gas (GHG) reductions not previously included in avoided energy costs. The value of these “non-embedded” GHG reductions was derived from the Avoided Energy Supply Costs in New England: 2015 Report (AESC Report).

The Resilient Rhode Island Act sets forth a carbon emission reduction goal of 80% below 1990 levels by 2050. The AESC Report determines that the marginal cost of stabilizing carbon dioxide (CO₂) emissions at 80% below 1990 levels by 2050 will be \$100 per short ton. The report finds this cost is a “reasonable estimate of the societal cost of carbon emissions, and hence as the long-term value of the cost of reductions in carbon emissions required to achieve those targets”.

In previous Plans, the Company incorporated the costs of CO₂ mitigation imposed and projected to be imposed by the Regional Greenhouse Gas Initiative (RGGI) and the costs associated with reasonably anticipated future federal greenhouse gas regulations in the avoided costs used in cost-effectiveness screening. The costs of compliance with RGGI and reasonably anticipated future federal regulations are one component of the \$100 per short ton value. These costs are already included or “embedded” in the projected electric energy market prices. Therefore, the difference between the \$100 per short ton societal cost and the regulatory compliance costs already embedded in the projected energy market prices represents the value of carbon emissions not included in the avoided energy costs.

¹⁴ For example, a 3 MW installation with an additional sales volume of approximately 150,000 Dth per year would generate approximately \$130,000 of marginal revenue per year under current rates. Assuming \$100,000 of capital costs, the project could qualify for up to \$573,000 in AGT funding, subject to budget limitations.

An example of this calculation for the year 2018 is shown below. The resulting \$91.53 non-embedded avoided cost is applied as a benefit in the RI Test in that year.

- Societal Cost (\$100) – Embedded Regulatory Compliance Cost (\$8.47) = Non-Embedded Cost (\$91.53)

The Company added the non-embedded CO₂ values from the following tables in the 2015 AESC report to the avoided costs used in the RI Test cost-effectiveness screening: Exhibit 4-5 for electric savings, Exhibit 4-14 for gas savings, and Exhibit 4-18 for oil savings.

The next revision to the AESC Report is due in 2018. The non-embedded value for New England's CO₂ emissions will be updated as part of this study and will be incorporated in the 2019 Annual Plan.

11) Economic Development Benefits (Non-CHP Measures)

In accordance with Section 1.2(B)(i) of the Standards, the RI Test now includes the application of multipliers for economic development impacts to all energy efficiency measures. This section details the methodology for applying economic benefits to non-CHP measures. Section number 9 in this document refers to the application of economic benefits to CHP measures.

The macroeconomic multipliers for the economic growth and job creation benefits of investing in cost-effective energy efficiency are derived from a recent study "Macroeconomic Impacts of Rhode Island Energy Efficiency Investments: REMI Analysis of National Grid's Energy Efficiency Programs", National Grid Customer Department, November, 2014.

The multipliers from the REMI analysis take into account how the energy efficiency programs impact Rhode Island's economy in three ways:

1. Program and participant spending represents a direct investment in Rhode Island energy efficiency infrastructure, creating jobs (construction impacts).
2. Bill savings to participants have positive economic impacts over the life of the energy efficiency measures, resulting in more spending on goods and services.
3. Rate increases and participant contributions to the cost of installing energy efficiency measures create short-term costs and reduce spending on goods and services.

It is likely that the benefit of bill savings to customers is already accounted for in cost-effectiveness screening since the value of all energy savings is included as a monetary benefit. In addition, the impact of customer costs is also already included as a negative dollar benefit. Therefore, to ensure no double counting of costs and benefits, only the multipliers associated with construction impacts should be included in the RI Test.

It is widely acknowledged that increased spending from installing energy efficiency measures creates jobs in the local economy. The Company, therefore, will apply the multipliers below to program and participant spending in its benefit-cost model. These multipliers are derived from Table 2 of the REMI analysis report.

GDP Multipliers for Construction Impacts		GDP/\$ Spending	
		Electric	Natural Gas
Residential	Program Spending	0.71	0.71
	Participant Spending	0.75	0.75
Commercial	Program Spending	0.56	0.56
	Participant Spending	0.58	0.58

The Company finds that this application is a suitable first step in incorporating economic development impacts to the RI Test. The Company plans to commission an updated economic impact study during the 2018 program year to refine these assumptions for its 2019 Annual Plan.

12) Utility Costs

Utility costs incurred to achieve implementation of energy efficiency measures and programs are appropriate for inclusion in the RI Test. These costs have been categorized as follows:

- Program Planning and Administration (PP&A): These costs are the administrative costs associated with the utility role in program delivery, including payroll, information technology, contract administration, and overhead expenses.
- Marketing: These are the costs of marketing and advertising to promote a program. The costs also include the payroll and expenses to manage marketing.
- Rebates and Other Customer Incentives: These are the incentives from the programs to customers to move them to install energy efficient equipment. Incentives include, but are not limited to, rebates to customers, copayments to vendors for direct installation of measures, payments to distributors to buy down the cost of their products for sale in retail stores, payments to vendors to create and deliver information, the cost of an education course, or payments to lenders to buy down the interest in a loan. Customer incentives typically cover a portion of the equipment and installation costs directly associated with the energy efficient

equipment being installed.¹⁵ For a retrofit project, the customer incentives cover a portion of the full cost of the efficiency project, as it is assumed that the alternative to the project is no customer action. For a failed equipment replacement/renovation/new construction project, these customer incentives cover a portion of the incremental additional costs associated with moving to a higher efficiency item or practice compared to what the customer would have done otherwise.

- Sales, Technical Assistance, and Training (STAT): These costs include the training and education of the trade ally community regarding the company's current energy efficiency programs. Examples of trade allies include but are not limited to: equipment vendors, heating contractors, lead vendors, project expeditors, weatherization contractors, and equipment installers. These costs also include the tasks associated with internal and contractual delivery of programs. Tasks associated with this budget category include but are not limited to: lead intake, customer service, rebate application, quality assurance, technical assessments, engineering studies, plan reviews, payroll and expenses.
- Evaluation: These are the costs of evaluation or market research studies to support program direction and post-installation studies to study program effectiveness or verification of savings estimates. These costs also include the payroll and expenses to manage the research.
- Shareholder Incentive: This is the incentive received by the Company for meeting specified savings goals and/or performance targets; because the Company would not implement energy efficiency programs to the extent it does without the incentive, the shareholder incentive is included in the cost of energy efficiency.

13) Customer Costs

The customer's costs include their contribution to the installation cost of the efficient measure. Typically, this is the portion of the equipment and installation cost not covered by the customer incentive. As noted above, it excludes the cost of equipment that might be part of the customer's construction project, but that is not related to the energy efficiency portion of the project.

Benefit/Cost Calculations

¹⁵ The full cost of the efficiency project is not necessarily the same thing as the full cost of the project being undertaken by the customer. For example, a customer may be renovating an HVAC system including installation of a new chiller and chilled water distribution. While the new distribution system may be part of the construction project, if it does not contribute to energy savings, it will not be included in the efficiency project cost; only the incremental cost of the new efficient chiller will be considered.

The cost effectiveness of a measure, program, or portfolio is simply the ratio of the net present value of the benefits to the net present value of the costs.

For the 2018 Annual Plan, all costs and benefits will be expressed in constant 2018 dollars. Where escalation of avoided costs or costs is needed to produce values in 2018 dollars, appropriate inflation rates are used.

The avoided value component for each benefit (e.g., electric energy, capacity, natural gas, etc.) is the cumulative net present value (in 2018 dollars) of lifetime avoided costs for each year of the planning horizon from the base year up to the measure life of the equipment. Since all of the future year values are in constant 2018 dollars, lifetime benefits thus calculated are discounted back to mid-2018 using a real discount rate equal to $[(1 + \text{Nominal Discount Rate}) / (1 + \text{Inflation})] - 1$.

As prescribed by the Standards, all values in the Plan and the benefit-cost model are stated in present value terms, “using a discount rate that appropriately reflects the risks of the investment of customer funds in energy efficiency; in other words, a low-risk discount rate which would indicate that energy efficiency is a low-risk resource in terms of cost of capital risk, project risk, and portfolio risk”. Specifically for the 2018 Annual Plan, the Company used a real discount rate of 0.27% equal to the twelve-month average of the historic yields from a ten-year United States Treasury note, using the 2016 calendar year to determine the twelve-month average.

The total benefits will equal the sum of the NPV of each benefit component:

[Energy Benefits + Generation Capacity Benefits + Avoided T&D Benefits + Natural Gas Benefits + Fuel Benefits + Water & Sewer Benefits + Non-Resource Benefits + Price Effects Benefits + Non-embedded Greenhouse Gas Reduction Benefits + Economic Development Benefits]

The total costs will equal the sum of the NPV of each cost component:

[Program Planning and Administration + Sales, Training, Technical assistance + Marketing + Rebates and Other Customer Incentives + Evaluation + Shareholder incentive+ Customer Cost]

The RI Test benefit/cost will then equal:

Total NPV Benefits/Total NPV Costs

Per the Standards, on a program level, all benefit categories are included in the benefit/cost calculation. All cost categories, except the shareholder incentive, are included at the program level because they are tracked at that level.¹⁶

On a sector level, the cost of pilots and educational/outreach programs which are not focused on producing savings and the projected shareholder incentive, are included with the other costs in the determination of cost effectiveness. The shareholder incentive is included at this level because it is designed to achieve savings targets by sector. At a portfolio level, the allocations to the Office of Energy Resources and EERMC are also included in the cost effectiveness calculation.

Separate calculations of benefits and cost-effectiveness are provided for the electric energy efficiency programs and natural gas energy efficiency programs. Some electric energy efficiency programs are expected to produce natural gas savings in addition to electricity savings while some natural gas energy efficiency programs are expected to produce electricity savings in addition to natural gas savings. All of the resource benefits produced by a program are shown with that program. For example, an HVAC project that improves air distribution incented through the electric Large C&I Retrofit Program will produce natural gas savings when natural gas is used by the participant for heating.

¹⁶ Commitments, if any, of customer incentives made from one year to the next are excluded from the program costs used in the benefit/cost calculation. The costs are only counted in the year in which the incentive is paid and the savings are counted.

Table E-1
National Grid
Electric DSM Funding Sources in 2018 by Sector
\$(000)

	<u>Projections by Sector</u>			
	<u>Income Eligible</u>	<u>Non-Income</u>	<u>Commercial &</u>	
	<u>Residential</u>	<u>Residential</u>	<u>Industrial</u>	<u>Total</u>
(1) Projected Budget (from E-2):	\$12,505.32	\$36,037.56	\$46,025.70	\$94,568.58
Sources of Other Funding:				
(2) Projected DSM Commitments at Year-End 2017:	\$0.00	\$0.00	\$0.00	\$0.00
(3) Projected Year-End 2017 Fund Balance and Interest:	\$0.00	(\$2,477.73)	\$11,373.53	\$8,895.80
(4) Projected FCM Payments from ISO-NE:	\$806.50	\$9,829.60	\$15,462.80	\$26,098.95
(5) Total Other Funding:	\$806.50	\$7,351.87	\$26,836.33	\$34,994.74
(6) Customer Funding Required:	\$11,698.82	\$28,685.69	\$19,189.37	\$59,573.84
(7) Payment to State Budget	\$0.0	\$0.0	\$0.0	\$12,500.0
(8) Total Funding Required:	\$11,698.8	\$28,685.7	\$19,189.4	\$72,073.8
(9) Forecasted kWh Sales:	225,348,908	2,746,458,844	4,320,390,848	7,292,198,600
(10) Energy Efficiency Program charge per kWh, excluding uncollectible recovery:				\$0.00988
(11) Proposed System Reliability Factor per kWh, excluding uncollectible recovery:				<u>\$0.00000</u>
(12) Total Proposed Energy Efficiency Charge per kWh, excluding uncollectible recovery:				\$0.00988
(13) Currently Effective Uncollectible Rate				1.25%
(14) Energy Efficiency Program charge per kWh, including uncollectible recovery:				\$0.01000
(15) Currently Effective EE Charge				<u>\$0.01124</u>
(16) Proposed Adjustment to Reflect Fully Reconciling Funding Mechanism				(\$0.00124)

Notes:

- (1) Projected Budget from E-2 includes OER and EERMC costs allocated to each sector based on forecasted sales and RIIB costs allocated to C&I sector.
- (2) DSM Commitments are projects that are under construction with anticipated completion in 2018.
- (3) Fund balance projections include projected revenue and spend through year end with Low Income sector set to \$0 through projected subsidization from other sectors, minus commitments which are illustrated separately on line (2).
- (4) The total projection of FCM revenue is allocated by kWh sales to each sector.
- (5) Line (1) + Line (2) + Line (3)
- (6) Line (1) - Line (5)
- (7) In accordance with Section 17 of 2017-H 5175 Substitute A as Amended, the 2018 Energy Efficiency and Conservation Procurement Plan includes \$12,500,000 in its Plan that will be transferred to the State Controller by June 30, 2018. Since this payment is not part of the implementation and oversight of energy efficiency programs it is not included in implementation budgets nor is it included in cost-effectiveness screening.
- (8) Line (6) + Line (7)
- (9) Per Company Forecast
- (10) Line (8) ÷ Line (9), truncated to 5 decimal places
- (11) Proposed System Reliability Factor is from the 2018 System Reliability Procurement Plan. Charge reflects projected year-end 2017 positive fund balance.
- (12) Line (10) + Line (11)
- (13) Per Energy Efficiency Program Provision, R.I.P.U.C. No 2172
- (14) Line (12) ÷ (1-Line (13), truncated to 5 decimal places
- (15) Currently Effective EE Charge includes System Reliability Factor and uncollectible recovery.
- (16) Line (14) - Line (15)

Table E-2
National Grid
2018 Electric Energy Efficiency Program Budget (\$000)

	Program Planning & Administration	Marketing	Rebates and Other Customer Incentives	Sales, Technical Assistance & Training	Evaluation & Market Research	Shareholder Incentive	Grand Total
Non-Income Eligible Residential							
Residential New Construction	\$63.9	\$2.5	\$407.0	\$238.0	\$52.1		\$763.4
ENERGY STAR® HVAC	\$70.2	\$108.5	\$1,494.9	\$512.3	\$18.8		\$2,204.7
EnergyWise	\$338.3	\$414.9	\$12,422.3	\$1,453.9	\$271.5		\$14,900.8
EnergyWise Multifamily	\$91.3	\$43.8	\$2,130.0	\$711.0	\$81.5		\$3,057.7
ENERGY STAR® Lighting	\$218.4	\$516.2	\$5,572.7	\$269.6	\$175.1		\$6,752.0
Residential Consumer Products	\$84.3	\$568.7	\$523.4	\$642.0	\$11.2		\$1,829.6
Home Energy Reports	\$84.7	\$10.9	\$2,466.2	\$10.2	\$52.3		\$2,624.4
Energy Efficiency Education Programs	\$0.0	\$40.0	\$0.0	\$0.0	\$0.0		\$40.0
Residential Demonstration and R&D	\$11.3	\$63.5	\$437.8	\$235.0	\$175.0		\$922.6
Community Based Initiatives - Residential	\$6.2	\$80.0	\$76.8	\$0.0	\$0.0		\$163.0
Comprehensive Marketing - Residential	\$5.7	\$550.8	\$0.0	\$0.0	\$0.1		\$556.7
Residential Shareholder Incentive	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$1,690.7	\$1,690.7
Subtotal - Non-Income Eligible Residential	\$974.4	\$2,399.9	\$25,531.1	\$4,072.0	\$837.6	\$1,690.7	\$35,505.7
Income Eligible Residential							
Single Family - Income Eligible Services	\$272.5	\$129.2	\$7,087.4	\$1,596.8	\$229.1		\$9,315.0
Income Eligible Multifamily	\$85.5	\$9.5	\$1,880.0	\$515.3	\$63.0		\$2,553.2
Income Eligible Shareholder Incentive	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$593.4	\$593.4
Subtotal - Income Eligible Residential	\$358.0	\$138.7	\$8,967.4	\$2,112.1	\$292.1	\$593.4	\$12,461.7
Commercial & Industrial							
Large Commercial New Construction	\$239.9	\$367.7	\$4,193.4	\$1,182.6	\$122.0		\$6,105.7
Large Commercial Retrofit	\$659.4	\$276.2	\$19,352.8	\$3,241.6	\$456.7		\$23,986.6
Small Business Direct Install	\$288.1	\$336.9	\$5,625.4	\$463.2	\$196.6		\$6,910.2
Commercial Demonstration and R&D	\$19.4	\$58.0	\$515.8	\$360.6	\$40.0		\$993.8
Community Based Initiatives - C&I	\$1.7	\$20.0	\$19.2	\$0.0	\$0.0		\$40.9
Comprehensive Marketing - C&I	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0		\$0.0
Finance Costs	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0		\$0.0
RI Infrastructure Bank	\$0.0	\$0.0	\$5,000.0	\$0.0	\$0.0		\$5,000.0
Commercial & Industrial Shareholder Incentive	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$2,151.86	\$2,151.9
Subtotal - Commercial & Industrial	\$1,208.5	\$1,058.8	\$34,706.5	\$5,248.0	\$815.3	\$2,151.9	\$45,189.1
Regulatory							
OER	\$706.1	\$0.0	\$0.0	\$0.0	\$0.0		\$706.1
EERMC	\$706.1	\$0.0	\$0.0	\$0.0	\$0.0		\$706.1
Subtotal - Regulatory	\$1,412.1	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$1,412.1
Grand Total	\$3,953.0	\$3,597.4	\$69,205.1	\$11,432.1	\$1,945.0	\$4,436.0	\$94,568.6
System Reliability Procurement							\$399.3

Notes:

- (1) 2017 Commitments are anticipated to be \$0.
- (2) For more information on Finance Costs, please refer to the 2018 C&I Program Description, Attachment 2.
- (3) OER and EERMC total 2.0% of customers' EE Program Charge collected on Table E-1, minus 2%.
- (4) System Reliability funds are included for illustrative purposes. They are part of the 2018 System Reliability Procurement Report, filed as a separate docket.

Table E-3
National Grid
Derivation of the 2018 Spending and Implementation Budgets (\$000)

	Proposed 2018 Budget From E-2	Regulatory Costs	Shareholder Incentive	Eligible Sector Spending Budget for Shareholder Incentive on E-9	Implementation Expenses for Cost- Effectiveness on E-5
Non-Income Eligible Residential					
Residential New Construction	\$763.4				\$763.4
ENERGY STAR® HVAC	\$2,204.7				\$2,204.7
EnergyWise	\$14,900.8				\$14,900.8
EnergyWise Multifamily	\$3,057.7				\$3,057.7
ENERGY STAR® Lighting	\$6,752.0				\$6,752.0
Residential Consumer Products	\$1,829.6				\$1,829.6
Home Energy Reports	\$2,624.4				\$2,624.4
Energy Efficiency Education Programs	\$40.0				\$40.0
Residential Demonstration and R&D	\$922.6				\$922.6
Community Based Initiatives - Residential	\$163.0				\$163.0
Comprehensive Marketing - Residential	\$556.7				\$556.7
Residential Shareholder Incentive	\$1,690.7		\$1,690.7		\$0.0
Subtotal - Non-Income Eligible Residential	\$35,505.7	\$0.0	\$1,690.7	\$33,815.0	\$33,815.0
Income Eligible Residential					
Single Family - Income Eligible Services	\$9,315.0				\$9,315.0
Income Eligible Multifamily	\$2,553.2				\$2,553.2
Income Eligible Shareholder Incentive	\$593.4		\$593.4		\$0.0
Subtotal - Income Eligible Residential	\$12,461.7	\$0.0	\$593.4	\$11,868.3	\$11,868.3
Commercial & Industrial					
Large Commercial New Construction	\$6,105.7				\$6,105.7
Large Commercial Retrofit	\$23,986.6				\$23,986.6
Small Business Direct Install	\$6,910.2				\$6,910.2
Commercial Demonstration and R&D	\$993.8				\$993.8
Community Based Initiatives - C&I	\$40.9				\$40.9
Comprehensive Marketing - C&I	\$0.0				\$0.0
Finance Costs	\$0.0				\$0.0
RI Infrastructure Bank	\$5,000.0				\$5,000.0
Commercial & Industrial Shareholder Incentive	\$2,151.9		\$2,151.9		\$0.0
Subtotal - Commercial & Industrial	\$45,189.1	\$0.0	\$2,151.9	\$43,037.2	\$43,037.2
Regulatory					
OER	\$706.1	\$706.1			\$706.1
EERMC	\$706.1	\$706.1			\$706.1
Subtotal - Regulatory	\$1,412.1	\$1,412.1	\$0.0	\$0.0	\$1,412.1
Grand Total	\$94,568.6	\$1,412.1	\$4,436.0	\$88,720.4	\$90,132.6

Notes:

- (1) Spending budget = Total Budget from E-2 minus Regulatory costs, and shareholder incentive.
(2) Implementation Expenses = Total Budget from E-2 minus shareholder incentive.

Table E-4
National Grid
Proposed 2018 Budget Compared to Approved 2017 Budget (\$000)

	Proposed Implementation Budget 2018	Approved Implementation Budget 2017	Difference
Non-Income Eligible Residential			
Residential New Construction	\$763.4	\$1,045.3	-\$281.9
ENERGY STAR® HVAC	\$2,204.7	\$1,669.5	\$535.2
EnergyWise	\$14,900.8	\$9,630.0	\$5,270.9
EnergyWise Multifamily	\$3,057.7	\$3,443.5	-\$385.8
ENERGY STAR® Lighting	\$6,752.0	\$9,412.4	-\$2,660.5
Residential Consumer Products	\$1,829.6	\$2,125.0	-\$295.4
Home Energy Reports	\$2,624.4	\$2,447.0	\$177.4
Energy Efficiency Education Programs	\$40.0	\$40.0	\$0.0
Residential Demonstration and R&D	\$922.6	\$1,179.5	-\$256.9
Community Based Initiatives - Residential	\$163.0	\$270.8	-\$107.8
Comprehensive Marketing - Residential	\$556.7	\$535.4	\$21.3
Subtotal - Non-Income Eligible Residential	\$33,815.0	\$31,798.4	\$2,016.5
Income Eligible Residential			
Single Family - Income Eligible Services	\$9,315.0	\$9,268.1	\$47.0
Income Eligible Multifamily	\$2,553.2	\$2,708.4	-\$155.2
Subtotal - Income Eligible Residential	\$11,868.3	\$11,976.5	-\$108.3
Commercial & Industrial			
Large Commercial New Construction	\$6,105.7	\$5,121.4	\$984.3
Large Commercial Retrofit	\$23,986.6	\$23,708.4	\$278.2
Small Business Direct Install	\$6,910.2	\$8,831.4	-\$1,921.2
Community Based Initiatives - C&I	\$40.9	\$0.0	\$40.9
Commercial Demonstration and R&D	\$993.8	\$874.4	\$119.4
Finance Costs	\$0.0	\$1,300.0	-\$1,300.0
RI Infrastructure Bank	\$5,000.0	\$4,900.0	\$100.0
Subtotal Commercial & Industrial	\$43,037.2	\$44,735.6	-\$1,698.4
Regulatory			
EERMC	\$706.1	\$816.3	-\$110.2
OER	\$706.1	\$816.3	-\$110.2
Subtotal Regulatory	\$1,412.1	\$1,632.5	-\$220.4
TOTAL IMPLEMENTATION BUDGET	\$90,132.6	\$90,143.1	-\$10.5
OTHER EXPENSE ITEMS			
Commitments	\$0.0	\$0.0	\$0.0
Company Incentive	\$4,436.0	\$4,425.5	\$10.5
Subtotal - Other Expense Items	\$4,436.0	\$4,425.5	\$10.5
TOTAL BUDGET	\$94,568.6	\$94,568.6	\$0.0

Notes:

- (1) Program Implementation Budget excludes Commitments, Company Incentive; derived on Table E-3
- (2) Total Budget includes Implementation, Commitments; illustrated on Table E-3

Table E-5
National Grid
Calculation of 2018 Program Year Cost-Effectiveness
All Dollar Values in (\$000)

	RI Test Benefit/ Cost¹	Total Benefit	Program Implementation Expenses²	Customer Contribution	Shareholder Incentive	¢/Lifetime kWh
Non-Income Eligible Residential						
Residential New Construction	2.10	\$ 1,815.5	\$ 763.4	\$ 99.3		11.7
ENERGY STAR® HVAC	2.50	\$ 8,925.9	\$ 2,204.7	\$ 1,365.4		13.6
EnergyWise	2.11	\$ 38,184.6	\$ 14,900.8	\$ 3,235.6		46.2
EnergyWise Multifamily	2.56	\$ 9,083.1	\$ 3,057.7	\$ 495.0		11.5
Home Energy Reports	1.88	\$ 4,931.6	\$ 2,624.4	\$ -		10.5
ENERGY STAR® Lighting	3.16	\$ 27,790.5	\$ 6,752.0	\$ 2,030.0		4.2
Residential Consumer Products	1.73	\$ 3,906.0	\$ 1,829.6	\$ 429.6		10.2
Energy Efficiency Education Programs			\$ 40.0			
Residential Demonstration and R&D			\$ 922.6			
Community Based Initiatives - Residential			\$ 163.0			
Comprehensive Marketing - Residential			\$ 556.7			
n-Income Eligible Residential SUBTOTAL	2.19	\$ 94,637.2	\$ 33,815.0	\$ 7,654.8	\$ 1,690.7	11.5
Income Eligible Residential						
Single Family - Income Eligible Services	3.28	\$ 30,565.2	\$ 9,315.0	\$ -		26.0
Income Eligible Multifamily	3.26	\$ 8,311.3	\$ 2,553.2	\$ -		10.6
Income Eligible Residential SUBTOTAL	3.12	\$ 38,876.5	\$ 11,868.3	\$ -	\$ 593.4	19.8
Commercial & Industrial						
Large Commercial New Construction	5.18	\$ 33,691.5	\$ 6,105.7	\$ 402.4		3.1
Large Commercial Retrofit	3.94	\$ 156,597.8	\$ 23,986.6	\$ 15,759.0		4.0
Small Business Direct Install	2.05	\$ 18,635.9	\$ 6,910.2	\$ 2,177.8		7.6
Commercial Demonstration and R&D			\$ 993.8			
Community Based Initiatives - C&I			\$ 40.9			
Finance Costs			\$ -			
RI Infrastructure Bank			\$ 5,000.0			
C&I SUBTOTAL	3.29	\$ 208,925.2	\$ 43,037.2	\$ 18,339.3	\$ 2,151.9	4.7
Regulatory						
OER			\$ 706.1			
EERMC			\$ 706.1			
Regulatory SUBTOTAL			\$ 1,412.1			
TOTAL	2.84	\$ 342,439.0	\$ 90,132.6	\$ 25,994.1	\$ 4,436.0	6.7

Notes:

(1) RI Test B/C Test = (Energy + Capacity + Resource Benefits+Economic Benefits + Carbon Benefits) / (Program Implementation + Customer Contribution + Shareholder Incentive)

Also includes effects of free-ridership and spillover.

(2) For Implementation Expenses derivation, see Table E-3.

Table E-5A
National Grid
Calculation of 2018 Program Year Cost-Effectiveness with TRC Test
All Dollar Values in (\$000)

	TRC Benefit/ Cost ¹	Total Benefit	Program Implementation Expenses ²	Customer Contribution	Shareholder Incentive	¢/Lifetime kWh
Non-Income Eligible Residential						
Residential New Construction	1.17	\$1,009.3	\$ 763.4	\$ 99.3		\$ 11.7
ENERGY STAR® HVAC	1.42	\$5,051.7	\$ 2,204.7	\$ 1,365.4		\$ 13.6
EnergyWise	1.24	\$22,520.2	\$ 14,900.8	\$ 3,235.6		\$ 46.2
EnergyWise Multifamily	1.62	\$5,759.7	\$ 3,057.7	\$ 495.0		\$ 11.5
Home Energy Reports	0.79	\$2,064.0	\$ 2,624.4	\$ -		\$ 10.5
ENERGY STAR® Lighting	1.67	\$14,629.6	\$ 6,752.0	\$ 2,030.0		\$ 4.2
Residential Consumer Products	0.94	\$2,132.7	\$ 1,829.6	\$ 429.6		\$ 10.2
Energy Efficiency Education Programs			\$ 40.0			
Residential Demonstration and R&D			\$ 922.6			
Community Based Initiatives - Residential			\$ 163.0			
Comprehensive Marketing - Residential			\$ 556.7			
Non-Income Eligible Residential SUBTOTAL	1.23	\$ 53,167.1	\$ 33,815.0	\$ 7,654.8	\$ 1,690.7	\$ 11.5
Income Eligible Residential				\$ -		
Single Family - Income Eligible Services	2.33	\$ 21,716.5	\$ 9,315.0	\$ -		\$ 26.0
Income Eligible Multifamily	2.27	\$ 5,802.2	\$ 2,553.2	\$ -		\$ 10.6
Income Eligible Residential SUBTOTAL	2.21	\$ 27,518.7	\$ 11,868.3	\$ -	\$ 593.4	\$ 19.8
Commercial & Industrial						
Large Commercial New Construction	3.29	\$ 21,430.4	\$ 6,105.7	\$ 402.4		\$ 3.1
Large Commercial Retrofit	2.37	\$ 94,370.7	\$ 23,986.6	\$ 15,759.0		\$ 4.0
Small Business Direct Install	1.02	\$ 9,230.3	\$ 6,910.2	\$ 2,177.8		\$ 7.6
Commercial Demonstration and R&D			\$ 993.8			
Comprehensive Marketing - C&I			\$ -			
Community Based Initiatives - C&I			\$ 40.9			
Finance Costs			\$ -			
RI Infrastructure Bank			\$ 5,000.0			
C&I SUBTOTAL	1.97	\$ 125,031.5	\$ 43,037.2	\$ 18,339.3	\$ 2,151.9	\$ 4.7
Regulatory						
OER			\$ 706.1			
EERMC			\$ 706.1			
Regulatory SUBTOTAL			\$ 1,412.1			
TOTAL	1.71	\$ 205,717.3	\$ 90,132.6	\$ 25,994.1	\$ 4,436.0	\$ 6.7

Notes:

(1) TRC B/C Test = (Energy + Capacity + Resource Benefits) / (Program Implementation + Customer Contribution + Shareholder Incentive)

Also includes effects of free-ridership and spillover.

(2) For Implementation Expenses derivation, see Table E-3.

Table E-6
National Grid
Summary of 2018 Benefits and Savings by Program

	Benefits (000's)														Load Reduction in kW			MWh Saved		MMBtu of Oil	
	Total	Capacity					Energy					Non Electric		Value	Summer	Winter	Lifetime	Maximum Annual	Lifetime	Annual	Lifetime
		Generation		Trans	MDC	DRIPE	Winter		Summer		DRIPE	Resource	Non Resource	CO2 Reductions							
		Summer	Winter				Peak	Off Peak	Peak	Off Peak											
Non-Income Eligible Residential																					
Residential New Construction	\$1,815	\$61	\$0	\$6	\$35	\$0	\$108	\$106	\$199	\$108	\$0	\$392	\$472	\$328	49	84	439	619	7,395	-	-
ENERGY STAR® HVAC	\$8,926	\$853	\$0	\$84	\$501	\$0	\$617	\$637	\$336	\$180	\$1	\$2,515	\$2,023	\$1,180	433	783	6,208	2,091	26,324	2,717	48,902
EnergyWise	\$38,185	\$229	\$0	\$25	\$150	\$0	\$1,027	\$702	\$433	\$271	\$3	\$16,947	\$16,514	\$1,884	286	1,047	1,843	6,157	39,239	28,566	547,580
EnergyWise Multifamily	\$9,083	\$404	\$0	\$43	\$254	\$0	\$862	\$713	\$226	\$169	\$2	\$448	\$4,508	\$1,455	329	979	3,139	4,207	30,898	838	13,259
Home Energy Reports	\$4,932	\$538	\$0	\$46	\$273	\$0	\$518	\$391	\$163	\$126	\$10	\$0	\$1,565	\$1,303	3,325	4,555	3,325	25,054	25,054	-	-
ENERGY STAR® Lighting	\$27,791	\$2,785	\$0	\$326	\$1,950	\$0	\$6,119	\$2,910	\$2,406	\$1,063	\$16	-\$7,999	\$7,652	\$10,563	4,413	5,674	23,861	38,891	210,289		
Residential Consumer Products	\$3,906	\$399	\$0	\$46	\$277	\$0	\$453	\$407	\$260	\$217	\$1	\$91	\$687	\$1,068	429	348	3,405	2,849	22,085	161	1,127
Non-Income Eligible Residential SUBTOTAL	\$94,637	\$5,268	\$0	\$575	\$3,441	\$0	\$9,703	\$5,866	\$4,022	\$2,134	\$33	\$12,393	\$33,421	\$17,780	9,264	13,471	42,221	79,868	361,283	32,282	610,868
Income Eligible Residential																					
Single Family - Income Eligible Services	\$30,565	\$777	\$0	\$81	\$484	\$0	\$946	\$788	\$371	\$249	\$2	\$10,419	\$14,816	\$1,632	696	781	5,976	4,185	35,759	17,346	336,802
Income Eligible Multifamily	\$8,311	\$234	\$0	\$23	\$139	\$0	\$648	\$519	\$214	\$161	\$1	\$846	\$4,394	\$1,130	170	530	1,718	3,287	24,176	1,689	26,354
Income Eligible Residential SUBTOTAL	\$38,877	\$1,011	\$0	\$104	\$623	\$0	\$1,594	\$1,307	\$585	\$411	\$3	\$11,266	\$19,210	\$2,762	865	1,312	7,694	7,472	59,935	19,035	363,156
Commercial & Industrial																					
Large Commercial New Construction	\$33,692	\$3,542	\$0	\$346	\$2,072	\$0	\$6,598	\$3,578	\$2,957	\$1,429	\$6	\$1,373	\$2,651	\$9,141	1,728	993	25,675	13,959	208,191		
Large Commercial Retrofit	\$156,598	\$18,998	\$0	\$1,972	\$11,798	\$0	\$25,987	\$20,980	\$11,468	\$8,275	\$30	-\$9,261	\$22,356	\$43,994	11,910	11,095	145,829	75,616	986,778		
Small Business Direct Install	\$18,636	\$1,571	\$0	\$168	\$1,006	\$0	\$3,003	\$2,551	\$1,296	\$1,001	\$4	-\$1,884	\$4,498	\$5,422	1,034	1,013	12,413	9,940	119,286		
C&I SUBTOTAL	\$208,925	\$24,111	\$0	\$2,486	\$14,876	\$0	\$35,588	\$27,108	\$15,721	\$10,706	\$40	-\$9,772	\$29,505	\$58,557	14,673	13,102	183,916	99,515	1,314,255	-	-
TOTAL	\$342,439	\$30,390	\$0	\$3,165	\$18,940	\$0	\$46,885	\$34,282	\$20,328	\$13,250	\$75	\$13,887	\$82,136	\$79,099	24,802	27,885	233,832	186,855	1,735,472	51,317	974,024

Table E-7
National Grid
Comparison of 2018 and 2017 Goals

	Proposed 2018			Approved 2017		Difference	
	Annual Demand Savings (kW)	Annual Energy Savings (MWh)	Planned Unique Participants	Annual Demand Savings (kW)	Annual Energy Savings (MWh)	Annual Demand Savings (kW)	Annual Energy Savings (MWh)
Non-Income Eligible Residential							
Residential New Construction	49	619	501	54	1,065	-5	-446
ENERGY STAR® HVAC	433	2,091	1,794	330	1,376	102	715
EnergyWise	286	6,157	10,000	376	6,545	-90	-388
EnergyWise Multifamily	329	4,207	6,000	288	3,519	41	689
Home Energy Reports	3,325	25,054	213,750	3,119	26,184	206	-1,130
ENERGY STAR® Lighting	4,413	38,891	292,150	5,466	46,856	-1,053	-7,965
Residential Consumer Products	429	2,849	9,682	705	4,708	-275	-1,860
Non-Income Eligible Residential SUBTOTAL	9,264	79,868	533,877	10,337	90,254	-1,073	-10,385
Income Eligible Residential							
Single Family - Income Eligible Services	696	4,185	2,750	652	4,350	44	-165
Income Eligible Multifamily	170	3,287	4,800	145	2,726	25	560
Income Eligible Residential SUBTOTAL	865	7,472	7,550	797	7,076	69	396
Commercial & Industrial							
Large Commercial New Construction	1,728	13,959	139	1,276	14,270	452	-311
Large Commercial Retrofit	11,910	75,616	2,193	13,317	77,611	-1,407	-1,995
Small Business Direct Install	1,034	9,940	565	2,815	12,136	-1,781	-2,196
C&I SUBTOTAL	14,673	99,515	2,897	17,409	104,017	-2,736	-4,502
TOTAL	24,802	186,855	544,324	28,543	201,347	-3,741	-14,491

Notes:

- (1) Planned 2018 participation takes into account net-to-gross and estimates unique participation by taking into account 2017 unique customer accounts to savings ratios. Therefore the number of planned measures may be more than the estimated participants shown. For measure counts please view the widget tables in Attachments 1 and 2. Table E-7 no longer includes a comparison to the previous year's participation. Due to the way unique participation is calculated it is not possible to compare year-over-year results.
- (2) There are additional Low Income participants in Residential New Construction.
- (3) A customer can participate in more than one program, for example, ENERGY STAR® Lighting and Home Energy Reports, therefore the population reached can be more than 100%.
- (4) Beginning in 2017, Home Energy Reports participation was counted as the number of customers receiving reports (i.e., the "treatment group") adjusted by the "Read Rate" of 75% from the most recent Customer Engagement Tracker Survey.

Table E-8
National Grid
Avoided Costs Used in 2018 Benefit-Cost Model

	Rhode Island					DRIPE for Installations in 2017				
	Winter Peak Energy	Winter Off-Peak Energy	Summer Peak Energy	Summer Off-Peak Energy	Annual Market Capacity Value	Winter Peak Energy	Winter Off-Peak Energy	Summer Peak Energy	Summer Off-Peak Energy	Annual Market Capacity Value
Units:	\$/kWh	\$/kWh	\$/kWh	\$/kWh	\$/kW-yr	\$/kWh	\$/kWh	\$/kWh	\$/kWh	\$/kW-yr
Period:										
2018	0.053	0.046	0.037	0.030	159.47	0.00	0.00	0.00	0.00	
2019	0.057	0.051	0.043	0.036	108.94					
2020	0.062	0.053	0.052	0.040	79.18					
2021	0.068	0.060	0.056	0.045	119.97					
2022	0.069	0.060	0.058	0.046	113.05					
2023	0.073	0.063	0.062	0.050	106.23					
2024	0.075	0.066	0.064	0.053	110.63					
2025	0.077	0.068	0.068	0.055	121.93					
2026	0.077	0.067	0.070	0.055	133.47					
2027	0.077	0.068	0.070	0.056	144.59					
2028	0.078	0.069	0.074	0.058	155.98					
2029	0.080	0.071	0.077	0.060	168.21					
2030	0.082	0.073	0.079	0.061	184.74					
2031	0.082	0.074	0.085	0.063	192.10					
2032	0.083	0.075	0.088	0.064	192.10					
2033	0.085	0.077	0.092	0.066	192.10					
2034	0.086	0.079	0.096	0.068	192.10					
2035	0.088	0.080	0.100	0.070	192.10					
2036	0.089	0.082	0.104	0.072	192.10					
2037	0.090	0.084	0.108	0.074	192.10					
2038	0.092	0.086	0.113	0.076	192.10					
2039	0.093	0.088	0.118	0.078	192.10					
2040	0.095	0.090	0.123	0.080	192.10					
2041	0.096	0.092	0.128	0.083	192.10					
2042	0.098	0.094	0.134	0.085	192.10					
2043	0.100	0.096	0.140	0.088	192.10					
2044	0.101	0.098	0.146	0.090	192.10					
2045	0.103	0.100	0.152	0.093	192.10					
2046	0.105	0.102	0.159	0.095	192.10					
2047	0.106	0.104	0.165	0.098	192.10					

Source:
AESC 2015 Study Update, Appendix B, in 2017 dollars

Table E-9
National Grid
2018 Targeted Shareholder Incentive

Energy Incentive Rate: 3.50%

	(1)	(2)	(3)	(4)	(5)
Sector	Spending Budget \$(000)	Target Incentive \$(000)	Annual kWh Savings Goal	Threshold kWh Savings	Target Incentive Per kWh
Income Eligible Residential	\$11,868	\$415	7,471,934	5,603,951	\$0.056
Non-Income Eligible Residential	\$33,815	\$1,184	79,868,307	59,901,230	\$0.015
Commercial & Industrial	\$43,037	\$1,506	99,515,244	74,636,433	\$0.015
Total	\$88,720	\$3,105	186,855,485	140,141,613	\$0.017

Demand Incentive Rate: 1.50%

	(6)	(7)	(8)	(9)	(10)
Sector	Spending Budget \$(000)	Target Incentive \$(000)	Annual kW Savings Goal	Threshold kW Savings	Target Incentive Per kW
Income Eligible Residential	\$11,868	\$178	865	649	\$205.8
Non-Income Eligible Residential	\$33,815	\$507	9,264	6,948	\$54.7
Commercial & Industrial	\$43,037	\$646	14,673	11,004	\$44.0
Total	\$88,720	\$1,331	24,802	18,602	\$53.7

Notes:

(1) and (6) Eligible Spending Budget excludes Regulatory Costs, and Shareholder Incentive. See Table E-3 for details.

(2) Equal to the incentive rate (3.5%) x Column (1).

(3) and (8) See Table E-7

(4) and (9) 75% of Column (3). No incentive is earned on annual kWh savings in the sector unless the Company achieves at least this threshold level of performance.

(5) Column (2)*1000/Column (3). This illustration is for achieved savings equal to the savings target. The incentive earned per kWh will vary with the percent of the savings target achieved

(7) Equal to the incentive rate (1.5%) x Column (1).

(10) Column (7)*1000/Column (8). This illustration is for achieved savings equal to the savings target. The incentive earned per kW will vary with the percent of the savings target achieved

The shareholder incentive for Energy and Demand incentives will be calculated as follows, where SB is the Spending Budget in the sector:

- From 75% of savings to 100% of savings: Shareholder Incentive = SB x (0.15 x % of savings achieved – 0.10)
- x 0.7 for electric energy savings
- x 0.3 for electric demand savings
- x 1.0 for natural gas savings
- From 100% of savings to 125% of savings: Shareholder Incentive = SB x (0.05 x % of savings achieved)

Table E-10
National Grid
Revolving Loan Fund Projections

Large C&I Revolving Loan Fund		Small Business Revolving Loan Fund	
(1) Total Loan Fund Deposits Through 2017	\$ 21,979,678	(1) Total Loan Fund Deposits Through 2017	\$ 4,658,971
(2) Current Loan Fund Balance	\$ 14,439,704	(2) Current Loan Fund Balance	\$ 2,747,899
<i>Loans Paid Year-To-Date</i>	\$ 5,377,709	<i>Loans Paid Year-To-Date</i>	\$ 1,518,374
<i>Repayments Year-To-Date</i>	\$ 2,429,390	<i>Repayments Year-To-Date</i>	\$ 1,805,496
(3) Projected Additional Loans by Year End 2017	\$ 5,994,473	(3) Projected Additional Loans by Year End 2017	\$ 1,718,084
(4) Projected Additional Repayments by Year End 2017	\$ 1,388,223	(4) Projected Additional Repayments by Year End 2017	\$ 902,748
(5) Projected Year End Loan Fund Balance 2017	\$ 9,833,453	(5) Projected Year End Loan Fund Balance 2017	\$ 1,932,563
(6) 2018 Fund Injection	\$ -	(6) 2018 Fund Injection	\$ -
(7) Projected Loan Fund Balance, January 2018	\$ 9,833,453	(7) Projected Loan Fund Balance, January 2018	\$ 1,932,563
(8) Projected Repayments throughout 2018	\$ 3,929,654	(8) Projected Repayments throughout 2018	\$ 2,000,000
(9) Estimated Loans in 2018	\$ 11,000,000	(9) Estimated Loans in 2018	\$ 2,800,000
(10) Projected Year End Loan Fund Balance 2018	\$ 2,763,107	(10) Projected Year End Loan Fund Balance 2018	\$ 1,132,563

Public Sector Revolving Loan Fund	
(1) Total Loan Fund Deposits Through 2017	\$ 1,562,529
(2) Current Loan Fund Balance	\$ 712,259
<i>Loans Paid Year-To-Date</i>	\$ -
<i>Repayments Year-To-Date</i>	\$ 229,074
(3) Projected Additional Loans by Year End	\$ 18,003
(4) Projected Additional Repayments by Year End	\$ 114,537
(5) Projected Year End Loan Fund Balance	\$ 808,793
(6) 2018 Fund Injection	\$ -
(7) Projected Loan Fund Balance, January 2018	\$ 808,793
(8) Projected Repayments throughout 2018	\$ 305,000
(9) Estimated Loans in 2018	\$ -
(10) Projected Year End Loan Fund Balance 2018	\$ 1,113,793

Notes

1 Funding injections since loan funds began.

Current Loan Fund Balance is through August 2017; it includes all loans and repayments made by August 2017. Public Sector Revolving Loan Fund reduced by transfers to RI PEP Incentives.

Projected Loans from September to Year-End 2017 is estimated based on projects currently under construction that are anticipated to be paid out by year-end. It is difficult to project this amount accurately due to the fact that projects could be delayed by a month or two resulting in payment occurring in 2018 instead of 2017.

4 Projected Repayments from September to Year-End 2017 is estimated based on the monthly average amount of repayments

5 Equal to (2) - (3) + (4)

6 Proposed 2018 Fund Injection detailed on Table E-2

7 Equal to (5) + (6)

8 Assumption based on monthly average repayments in 2017 over 12 month period; repayments accumulate over time and may vary widely.

9 Amount projected to be lent to customers in 2018

10 Equal to (7) + (8) - (9)

**Table G-1
National Grid
Gas DSM Funding Sources in 2018 by Sector
\$(000)**

	<u>Projections by Sector</u>			
	Income Eligible Residential	Non-Income Eligible Residential	Commercial & Industrial	Total
(1) Projected Budget (from G-2):	\$6,716.1	\$13,391.4	\$7,973.4	\$28,080.9
Sources of Other Funding:				
(2) Estimated Year-End 2017 Fund Balance and Interest:	\$1,051.06	(\$2,819.9)	(\$491.3)	(\$2,260.1)
(3) Low Income Weatherization in Base Rates:	<u>\$200.00</u>			<u>\$200.00</u>
(4) Total Other Funding:	\$1,251.1	(\$2,819.9)	(\$491.3)	(\$2,060.1)
(5) Customer Funding Required:	\$5,465.0	\$16,211.3	\$8,464.6	\$30,141.0
(6) Forecasted Firm Dth Sales	1,472,733	17,914,287	20,035,568	39,422,588
(7) Forecasted Non Firm Dth Sales			169,933	169,933
(8) Less: Exempt DG Customers			(1,371,214)	(1,371,214)
(9) Forecasted Dth Sales:	1,472,733	17,914,287	18,834,287	38,221,307
Average Energy Efficiency Program Charge per Dth				
(10) excluding Uncollectible Recovery:				\$0.788
Proposed Energy Efficiency Program Charge per Dth				
(11) excluding Uncollectible Recovery	\$0.870	\$0.870	\$0.704	
(12) Currently Effective Uncollectible Rate	<u>3.18%</u>	<u>3.18%</u>	<u>3.18%</u>	
Proposed Energy Efficiency Program Charge per				
(13) Dth including Uncollectible Recovery:	\$0.898	\$0.898	\$0.727	
Currently Effective Energy Efficiency Program Charge				
(14) per Dth	\$0.888	\$0.888	\$0.726	
Adjustment to Reflect Fully Reconciling Funding				
(15) Mechanism	\$0.010	\$0.010	\$0.001	

Notes

(1) Projected Budget from G-2 includes OER and EERMC costs allocated to each sector based on forecasted sales.

(2) Fund Balance projections include projected revenue and spend through year-end with Residential and C&I sector subsidies applied to Income Eligible as detailed in the 2017 EE Plan Table G-1.

(11) As agreed to by the settling parties, the proposed EE program charges allow for the use of collections from one sector to fund energy efficiency services in other sectors that would otherwise not be supported with the proposed collection rates. The C&I charge includes collection of \$4,807.1 of which \$4,182.6 will be allocated to the low income sector and \$626.5 to the residential sector.

**Table G-2
National Grid
2018 Gas Energy Efficiency Program Budget (\$000)**

	Program Planning and Administration	Marketing	Rebates and Other Customer Incentives	Sales, Technical Assistance and Training	Evaluation & Market Research	Shareholder Incentive	Grand Total
Non-Income Eligible Residential:							
ENERGY STAR [®] HVAC	\$51.7	\$119.7	\$1,309.3	\$243.7	\$2.5	\$0.0	\$1,727.0
EnergyWise	\$202.3	\$80.7	\$6,726.1	\$1,338.8	\$18.9	\$0.0	\$8,366.8
EnergyWise Multifamily	\$51.8	\$33.6	\$797.5	\$356.0	\$11.7	\$0.0	\$1,250.6
Home Energy Reports	\$18.9	\$1.0	\$397.9	\$5.1	\$4.7	\$0.0	\$427.5
Residential Demonstration and R&D	\$0.1	\$19.5	\$0.0	\$0.0	\$0.0	\$0.0	\$19.6
Residential New Construction	\$18.8	\$3.1	\$368.5	\$181.3	\$14.3	\$0.0	\$585.9
Comprehensive Marketing - Residential	\$0.5	\$73.2	\$0.0	\$0.0	\$0.0	\$0.0	\$73.7
Community Based Initiatives - Residential	\$0.0	\$20.0	\$19.2	\$0.0	\$0.0	\$0.0	\$39.2
Residential Shareholder Incentive	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$624.5	\$624.5
Subtotal - Non-Income Eligible Residential	\$344.1	\$350.7	\$9,618.4	\$2,125.0	\$52.1	\$624.5	\$13,114.7
Income Eligible Residential:							
Single Family - Income Eligible Services	\$116.8	\$14.6	\$3,037.5	\$812.3	\$47.7	\$0.0	\$4,028.8
Income Eligible Multifamily	\$70.1	\$9.9	\$1,885.8	\$348.9	\$31.2	\$0.0	\$2,345.8
Income Eligible Shareholder Incentive	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$318.7	\$318.7
Subtotal - Income Eligible Residential	\$186.8	\$24.4	\$4,923.3	\$1,161.2	\$78.9	\$318.7	\$6,693.3
Commercial & Industrial							
Large Commercial New Construction	\$79.2	\$194.7	\$1,601.4	\$658.4	\$118.0	\$0.0	\$2,651.7
Large Commercial Retrofit	\$140.6	\$291.8	\$1,644.2	\$1,452.3	\$103.2	\$0.0	\$3,632.1
Small Business Direct Install	\$5.1	\$26.9	\$57.0	\$40.0	\$3.4	\$0.0	\$132.3
Commercial & Industrial Multifamily	\$18.0	\$15.6	\$264.5	\$109.6	\$0.9	\$0.0	\$408.6
Commercial Demonstration and R&D	\$0.1	\$18.5	\$331.1	\$106.4	\$26.0	\$0.0	\$482.1
Finance Costs	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
RI Infrastructure Bank	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0
Community Based Initiatives - C&I	\$0.0	\$5.0	\$4.8	\$0.0	\$0.0	\$0.0	\$9.8
Commercial & Industrial Shareholder Incentive	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$365.8	\$365.8
Subtotal - Commercial & Industrial	\$243.0	\$552.6	\$3,903.0	\$2,366.7	\$251.4	\$365.83	\$7,682.5
Regulatory							
EERMC	\$295.2	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$295.2
OER	\$295.2	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$295.2
Subtotal - Regulatory	\$590.3	\$0.0	\$0.0	\$0.0	\$0.0	\$0.0	\$590.3
Grand Total	\$1,364.2	\$927.6	\$18,444.7	\$5,652.9	\$382.4	\$1,309.1	\$28,080.9

Notes:

(1) OER and EERMC is equal to 2% of total collections from customers' Energy Efficiency Program Charge, reduced by 2%.

Table G-3
National Grid
Derivation of the 2018 Spending & Implementation Budgets (\$000)

	Proposed 2018 Budget From G-2 (\$000)	Outside Finance and Stakeholder Oversight Costs (\$000)	Shareholder Incentive (\$000)	Eligible Sector Spending Budget for Shareholder Incentive on G-9 (\$000) ¹	Implementation Expenses for Cost-Effectiveness on G-5 (\$000) ²
Non-Income Eligible Residential					
ENERGY STAR® HVAC	\$ 1,727.0		\$ -		\$ 1,727.0
EnergyWise	\$ 8,366.8		\$ -		\$ 8,366.8
EnergyWise Multifamily	\$ 1,250.6		\$ -		\$ 1,250.6
Home Energy Reports	\$ 427.5		\$ -		\$ 427.5
Residential Demonstration and R&D	\$ 19.6		\$ -		\$ 19.6
Residential New Construction	\$ 585.9				\$ 585.9
Comprehensive Marketing - Residential	\$ 73.7		\$ -		\$ 73.7
Community Based Initiatives - Residential	\$ 39.2		\$ -		\$ 39.2
Residential Shareholder Incentive	\$ 624.5		\$ 624.5		\$ -
Subtotal - Non-Income Eligible Residential	\$ 13,114.7	\$ -	\$ 624.5	\$ 12,490.2	\$ 12,490.2
Income Eligible Residential					
Single Family - Income Eligible Services	\$ 4,028.8		\$ -		\$ 4,028.8
Income Eligible Multifamily	\$ 2,345.8		\$ -		\$ 2,345.8
Income Eligible Shareholder Incentive	\$ 318.7		\$ 318.7		\$ -
Subtotal - Income Eligible Residential	\$ 6,693.3	\$ -	\$ 318.7	\$ 6,374.6	\$ 6,374.6
Commercial & Industrial					
Large Commercial New Construction	\$ 2,651.7		\$ -		\$ 2,651.7
Large Commercial Retrofit	\$ 3,632.1		\$ -		\$ 3,632.1
Small Business Direct Install	\$ 132.3		\$ -		\$ 132.3
Commercial & Industrial Multifamily	\$ 408.6		\$ -		\$ 408.6
Commercial Demonstration and R&D	\$ 482.1		\$ -		\$ 482.1
Finance Costs	\$ -	\$ -	\$ -		\$ -
Community Based Initiatives - C&I	\$ 9.8		\$ -		\$ 9.8
Commercial & Industrial Shareholder Incentive	\$ 365.8		\$ 365.8		\$ -
Subtotal - Commercial & Industrial	\$ 7,682.5	\$ -	\$ 365.8	\$ 7,316.7	\$ 7,316.7
Regulatory					
EERMC	\$ 295.2	\$ 295.2			\$ 295.2
OER	\$ 295.2	\$ 295.2			\$ 295.2
Subtotal - Regulatory	\$ 590.3	\$ 590.3	\$ -		\$ 590.3
Grand Total	\$ 28,080.9	\$ 590.3	\$ 1,309.1	\$ 26,181.5	\$ 26,771.8

Notes:

- (1) Eligible Sector Spending Budget = Budget from G-2 minus Regulatory Costs and Shareholder Incentive
(2) Implementation Expenses = Budget from G-2 minus Shareholder Incentive

Table G-4
National Grid
Proposed 2018 Budget Compared to Approved 2017 Budget (\$000)

	Proposed Budget 2018 from G-2	2017 Approved Gas Budget	Difference
Non-Income Eligible Residential			
ENERGY STAR® HVAC	\$ 1,727.0	\$ 1,803.5	\$ (76.5)
EnergyWise	\$ 8,366.8	\$ 6,917.2	\$ 1,449.6
EnergyWise Multifamily	\$ 1,250.6	\$ 1,823.6	\$ (572.9)
Home Energy Reports	\$ 427.5	\$ 497.0	\$ (69.5)
Residential Demonstration and R&D	\$ 19.6	\$ 264.4	\$ (244.8)
Residential New Construction	\$ 585.9	\$ 840.7	\$ (254.8)
Comprehensive Marketing - Residential	\$ 73.7	\$ 69.8	\$ 3.8
Community Based Initiatives - Residential	\$ 39.2	\$ 79.6	\$ (40.4)
Residential Shareholder Incentive	\$ 624.5	\$ 614.8	\$ 9.7
Subtotal - Non-Income Eligible Residential	\$ 13,114.7	\$ 12,910.5	\$ 204.3
Income Eligible Residential			
Single Family - Income Eligible Services	\$ 4,028.8	\$ 3,640.6	\$ 388.2
Income Eligible Multifamily	\$ 2,345.8	\$ 2,216.6	\$ 129.3
Income Eligible Shareholder Incentive	\$ 318.7	\$ 292.9	\$ 25.9
Subtotal - Income Eligible Residential	\$ 6,693.3	\$ 6,150.0	\$ 543.3
Commercial & Industrial			
Large Commercial New Construction	\$ 2,651.7	\$ 2,086.3	\$ 565.4
Large Commercial Retrofit	\$ 3,632.1	\$ 5,830.5	\$ (2,198.4)
Small Business Direct Install	\$ 132.3	\$ 268.7	\$ (136.4)
Commercial & Industrial Multifamily	\$ 408.6	\$ 738.9	\$ (330.2)
Commercial Demonstration and R&D	\$ 482.1	\$ 73.8	\$ 408.3
Finance Costs	\$ -	\$ 500.0	\$ (500.0)
RI Infrastructure Bank	\$ -	\$ 100.0	\$ (100.0)
Community Based Initiatives - C&I	\$ 9.8	\$ -	\$ 9.8
Commercial & Industrial Shareholder Incentive	\$ 365.8	\$ 479.9	\$ (114.1)
Subtotal Commercial & Industrial	\$ 7,682.5	\$ 10,078.0	\$ (2,395.5)
Regulatory			
EERMC	\$ 295.2	\$ 304.3	\$ (9.1)
OER	\$ 295.2	\$ 304.3	\$ (9.1)
Subtotal Regulatory	\$ 590.3	\$ 608.5	\$ (18.2)
TOTAL BUDGET	\$ 28,080.9	\$ 29,747.1	\$ (1,666.2)

Notes:

(1) RIIB expense moved to electric sector for Program Year 2018.

Table G-5
National Grid
Calculation of 2018 Program Year Cost-Effectiveness
All Dollar Values in (\$000)

	Rhode Island Benefit/ Cost	Total Benefit	Program Implementation Expenses	Customer Contribution	Shareholder Incentive	\$/Lifetime MMBtu
Non-Income Eligible Residential						
Energy Star® HVAC	2.35	\$ 11,069.6	\$ 1,727.0	\$ 2,988.3		\$ 9.89
EnergyWise	1.92	\$ 20,460.7	\$ 8,366.8	\$ 2,301.5		\$ 16.37
EnergyWise MultiFamily	3.42	\$ 4,963.0	\$ 1,250.6	\$ 199.4		\$ 7.31
Home Energy Reports	3.08	\$ 1,318.1	\$ 427.5	\$ -		\$ 5.54
Residential New Construction	1.61	\$ 1,038.2	\$ 585.9	\$ 59.4		\$ 10.30
Comprehensive Marketing - Residential			\$ 73.7			
Community Based Initiatives - Residential			\$ 39.2			
Residential Demonstration and R&D			\$ 19.6			
Non-Income Eligible Residential Subtotal	2.08	\$ 38,849.6	\$ 12,490.2	\$ 5,548.6	\$ 624.5	\$ 12.30
Income Eligible Residential						
Single Family - Income Eligible Services	3.23	\$ 13,030.0	\$ 4,028.8	\$ -		\$ 15.96
Income Eligible Multifamily	3.33	\$ 7,821.5	\$ 2,345.8	\$ -		\$ 8.18
Income Eligible Residential Subtotal	3.27	\$ 20,851.4	\$ 6,374.6	\$ -	\$ 318.7	\$ 11.83
Large Commercial & Industrial						
Large Commercial New Construction	2.67	\$ 12,451.1	\$ 2,651.7	\$ 2,015.1		\$ 5.85
Large Commercial Retrofit	5.43	\$ 25,463.3	\$ 3,632.1	\$ 1,054.6		\$ 2.56
Small Business Direct Install	3.73	\$ 537.7	\$ 132.3	\$ 11.9		\$ 4.85
Commercial & Industrial Multifamily	7.58	\$ 3,321.7	\$ 408.6	\$ 29.4		\$ 4.70
Commercial Demonstration and R&D			\$ 482.1			
Community Based Initiatives - C&I			\$ 9.8			
Finance Costs			\$ -			
Commercial & Industrial Subtotal	3.87	\$ 41,773.8	\$ 7,316.7	\$ 3,111.0	\$ 365.8	\$ 3.79
Regulatory						
EERMC			\$ 295.2			
OER			\$ 295.2			
Regulatory Subtotal			\$ 590.3			
Grand Total	2.76	\$ 101,474.8	\$ 26,771.8	\$ 8,659.6	\$ 1,309.1	\$ 7.45

Table G-5A
National Grid
Calculation of 2018 Program Year Cost-Effectiveness with TRC Test
All Dollar Values in (\$000)

	TRC Benefit/ Cost	Total Benefit	Program Implementation Expenses	Customer Contribution	Shareholder Incentive	\$/Lifetime MMBtu
Non-Income Eligible Residential						
Energy Star® HVAC	1.25	\$ 5,899.2	\$ 1,727.0	\$ 2,988.3		\$ 9.89
EnergyWise	1.09	\$ 11,590.0	\$ 8,366.8	\$ 2,301.5		\$ 16.37
EnergyWise MultiFamily	2.36	\$ 3,422.0	\$ 1,250.6	\$ 199.4		\$ 7.31
Home Energy Reports	1.27	\$ 541.1	\$ 427.5	\$ -		\$ 5.54
Residential New Construction	0.97	\$ 624.2	\$ 585.9	\$ 59.4		\$ 10.30
Comprehensive Marketing - Residential			\$ 73.7			
Community Based Initiatives - Residential			\$ 39.2			
Residential Demonstration and R&D			\$ 19.6			
Non-Income Eligible Residential Subtotal	1.18	\$ 22,076.6	\$ 12,490.2	\$ 5,548.6	\$ 624.5	\$ 12.30
Income Eligible Residential						
Single Family - Income Eligible Services	2.40	\$ 9,671.7	\$ 4,028.8	\$ -		\$ 15.96
Income Eligible Multifamily	2.26	\$ 5,306.1	\$ 2,345.8	\$ -		\$ 8.18
Income Eligible Residential Subtotal	2.35	\$ 14,977.8	\$ 6,374.6	\$ -	\$ 318.7	\$ 11.83
Large Commercial & Industrial						
Large Commercial New Construction	1.55	\$ 7,248.2	\$ 2,651.7	\$ 2,015.1		\$ 5.85
Large Commercial Retrofit	3.22	\$ 15,080.9	\$ 3,632.1	\$ 1,054.6		\$ 2.56
Small Business Direct Install	2.55	\$ 368.0	\$ 132.3	\$ 11.9		\$ 4.85
Commercial & Industrial Multifamily	6.27	\$ 2,746.1	\$ 408.6	\$ 29.4		\$ 4.70
Commercial Demonstration and R&D			\$ 482.1			
Community Based Initiatives - C&I			\$ 9.8			
Finance Costs			\$ -			
Commercial & Industrial Subtotal	2.36	\$ 25,443.3	\$ 7,316.7	\$ 3,111.0	\$ 365.8	\$ 3.79
Regulatory						
EERMC			\$ 295.2			
OER			\$ 295.2			
Regulatory Subtotal			\$ 590.3			
Grand Total	1.70	\$ 62,497.7	\$ 26,771.8	\$ 8,659.6	\$ 1,309.1	\$ 7.45

Table G-6
National Grid
Summary of 2018 Benefits and Savings by Program

	Benefits (\$000)			MMBTU Gas Saved	
	Total	Natural Gas	Non-Gas Benefit	Annual	Lifetime
Non-Income Eligible Residential					
EnergyWise	\$20,460.7	\$9,052.9	\$11,407.8	26,787	651,844
Energy Star® HVAC	\$11,069.6	\$6,555.2	\$4,514.4	27,513	476,963
EnergyWise Multifamily	\$4,963.0	\$2,847.9	\$2,115.1	12,069	198,403
Home Energy Reports	\$1,318.1	\$966.6	\$351.5	77,220	77,220
Residential New Construction	\$1,038.2	\$866.9	\$171.4	3,117	62,649
Non-Income Eligible Residential SUBTOTAL	\$38,849.6	\$20,289.5	\$18,560.1	146,706	1,467,079
Income Eligible Residential					
Single Family - Income Eligible Services	\$13,030.0	\$3,492.8	\$9,537.2	12,620	252,400
Income Eligible Multifamily	\$7,821.5	\$4,153.9	\$3,667.5	16,222	286,654
Income Eligible Residential SUBTOTAL	\$20,851.4	\$7,646.7	\$13,204.7	28,842	539,054
Commercial & Industrial					
Large Commercial New Construction	\$12,451.1	\$10,464.8	\$1,986.2	42,764	798,090
Large Commercial Retrofit	\$25,463.3	\$23,922.8	\$1,540.4	186,780	1,828,898
Small Business Direct Install	\$537.7	\$508.4	\$29.3	3,059	29,753
Commercial & Industrial Multifamily	\$3,321.7	\$1,278.6	\$2,043.1	6,643	93,179
Commercial & Industrial SUBTOTAL	\$41,773.8	\$36,174.7	\$5,599.0	239,246	2,749,920
TOTAL	\$101,474.8	\$64,110.9	\$37,363.8	414,795	4,756,052

Table G-7
National Grid
Comparison of 2018 and 2017 Goals

	Proposed 2018		Approved 2017	Difference
	Annual Energy Savings (MMBTU Natural Gas)	Planned Unique Participants	Annual Energy Savings (MMBTU Natural Gas)	Annual Energy Savings (MMBTU Natural Gas)
Non-Income Eligible Residential				
EnergyWise	26,787	2,275	28,587	-1,800
Energy Star® HVAC	27,513	1,557	27,393	121
EnergyWise Multifamily	12,069	2,500	11,518	550
Home Energy Reports	77,220	104,250	59,164	18,056
Residential New Construction	3,117	255	11,575	-8,458
Non-Income Eligible Residential SUBTOTAL	146,706	110,837	138,237	8,469
Income Eligible Residential				
Single Family - Income Eligible Services	12,620	675	11,032	1,588
Income Eligible Multifamily	16,222	3,500	15,810	412
Income Eligible Residential SUBTOTAL	28,842	4,175	26,842	2,000
Commercial & Industrial				
Large Commercial New Construction	42,764	105	53,516	-10,752
Large Commercial Retrofit	186,780	158	187,938	-1,158
Small Business Direct Install	3,059	30	3,639	-580
Commercial & Industrial Multifamily	6,643	1,698	4,434	2,209
Commercial & Industrial SUBTOTAL	239,246	1,992	249,527	-10,281
TOTAL	414,795	117,004	414,606	189

Notes:

- (1) Participants can participate in more than one program, for example Home Energy Reports and EnergyWise.
- (2) Planned 2018 participation takes into account net-to-gross and estimates unique participation by taking into account 2016 unique customer accounts to savings ratios. Therefore the number of planned measures may be more than the planned participants. For measure counts please view the widgets tables at the end of the Residential and C&I text sections. Table G-7 no longer includes a comparison to the previous year's participation. Due to the way unique participation is calculated it is not possible to compare year-over-year results.
- (3) Beginning in 2017, Home Energy Reports participation will be counted as the number of customers receiving reports (i.e., the "treatment group") adjusted by the "Read Rate" of 75% from the most recent Customer Engagement Tracker Survey.

Table G-8
National Grid
Avoided Costs Used in 2018 Benefit-Cost Model

Year	RESIDENTIAL				COMMERCIAL & INDUSTRIAL			ALL RETAIL END USES
	Non Heating	Hot Water	Heating	All	Non Heating	Heating	All	
2018	4.53	5.92	6.38	6.16	4.76	5.70	5.36	5.77
2019	5.21	6.48	6.90	6.72	5.40	6.27	5.96	6.35
2020	5.67	6.92	7.33	7.15	5.85	6.70	6.40	6.78
2021	6.07	7.33	7.75	7.56	6.25	7.11	6.80	7.19
2022	6.00	7.25	7.67	7.50	6.19	7.04	6.73	7.13
2023	6.35	7.61	8.02	7.84	6.54	7.39	7.09	7.47
2024	6.64	7.91	8.33	8.14	6.82	7.68	7.37	7.76
2025	6.76	8.02	8.43	8.25	6.95	7.80	7.50	7.88
2026	6.59	7.85	8.27	8.08	6.77	7.63	7.32	7.71
2027	6.49	7.76	8.18	7.99	6.68	7.54	7.23	7.62
2028	6.55	7.80	8.22	8.04	6.73	7.58	7.28	7.67
2029	6.60	7.85	8.27	8.10	6.78	7.63	7.33	7.73
2030	6.60	7.85	8.27	8.10	6.79	7.64	7.34	7.73
2031	6.55	7.81	8.22	8.05	6.74	7.59	7.29	7.68
2032	6.61	7.86	8.28	8.11	6.80	7.65	7.35	7.74
2033	6.67	7.92	8.34	8.17	6.86	7.71	7.40	7.80
2034	6.73	7.98	8.40	8.23	6.92	7.76	7.46	7.86
2035	6.79	8.04	8.46	8.28	6.98	7.82	7.52	7.92
2036	6.85	8.10	8.52	8.34	7.04	7.88	7.58	7.97
2037	6.91	8.16	8.58	8.40	7.10	7.94	7.64	8.03
2038	6.97	8.22	8.64	8.46	7.16	8.00	7.70	8.10
2039	7.03	8.28	8.70	8.52	7.22	8.06	7.76	8.16
2040	7.10	8.34	8.76	8.59	7.28	8.13	7.83	8.22
2041	7.16	8.40	8.82	8.65	7.34	8.19	7.89	8.28
2042	7.22	8.47	8.88	8.71	7.41	8.25	7.95	8.34
2043	7.29	8.53	8.94	8.77	7.47	8.31	8.01	8.40
2044	7.35	8.59	9.01	8.83	7.54	8.38	8.08	8.47
2045	7.42	8.66	9.07	8.90	7.60	8.44	8.14	8.53
2046	7.48	8.72	9.13	8.96	7.67	8.50	8.21	8.60

From 2015 Avoided Cost Study Update
Appendix C for Southern New England

Table G-9
National Grid
2018 Targeted Shareholder Incentive

Incentive Rate: 5.00%

	(1)	(2)	(3)	(4)	(5)
Sector	Eligible Spending Budget \$(000)	Target Incentive \$(000)	Target Savings Goal (MMBTU)	Threshold Savings (MMBTU)	Target Incentive Per Annual MMBTU
Income Eligible Residential	\$6,375	\$318.7	28,842	21,632	\$11.05
Non-Income Eligible Residential	\$12,490	\$624.5	146,706	110,030	\$4.26
Commercial & Industrial	\$7,317	\$365.8	239,246	179,435	\$1.53
Total	\$26,182	\$1,309.1	414,795	311,096	\$3.16

Notes:

- (1) Eligible Spending Budget excludes EERMC, OER, and Shareholder Incentive. See Table G-3 for details.
 - (2) Equal to the incentive rate (5.0%) x Column (1).
 - (3) See Table G-7
 - (4) 75% of Column (3). No incentive is earned on annual MMBTU savings in the sector unless the Company achieves at least this threshold level of performance.
 - (5) Column (2)*1000/Column (3). This illustration is for achieved savings equal to the savings target. The incentive earned per MMBtu will vary with the percent of the savings target achieved
- The shareholder incentive will be calculated as follow, where SB is the Spending Budget in the sector
- From 75% of savings to 100% of savings: Shareholder Incentive = SB x (0.15 x % of savings achieved – 0.10)
 - From 100% of savings to 125% of savings: Shareholder Incentive = SB x (0.05 x % of savings achieved)

Table G-10
National Grid
Revolving Loan Fund Projections

Large C&I Revolving Loan Fund

(1)	Total Loan Fund Deposits Through 2017	\$ 1,291,679
(2)	Current Loan Fund Balance	\$ 1,967,496
(3)	Projected Loans by Year End 2017	\$ 487,871
(4)	Projected Repayments by Year End 2017	\$ 200,000
(5)	Projected Year End Loan Fund Balance 2017	\$ 1,679,625
(6)	2018 Fund Injection	\$ -
(7)	Projected Loan Fund Balance, January 2018	\$ 1,679,625
(8)	Projected Repayments throughout 2018	\$ 600,000
(9)	Estimated Loans in 2018	\$ 1,000,000
(10)	Projected Year End Loan Fund Balance 2018	\$ 1,279,625

Notes

2 Current Loan Fund Balance is through July 2017

3 Projected Loans by Year End 2017 is estimated based on current commitments

4 Projected Repayments by Year End 2017 is estimated based on projected loans by year end and repayment schedules

5 Equal to (2) - (3) + (4)

6 Fund Injection, as budgeted on E-2

7 Equal to (5) + (6)

8 Assumption based on average repayments over 12 months; repayments accumulate over time and may vary widely.

2018 Bill Impacts

Summary

National Grid has performed an analysis of the electric and gas bill impacts resulting from the proposed 2018 Energy Efficiency Program Plan. Bill impacts are distinct from rate impacts because they model the long term effects of efficiency programs on customer bills by aggregating rate and consumption changes. In the electric bill impact analysis, rate impacts are modeled by mapping EE programs to rate classes and estimating changes in both delivery service rates and supply costs due to the energy efficiency (EE) program charge proposed in the Plan. Consumption impacts are predicted from proposed participation and energy efficiency savings. Where possible, other effects of energy efficiency beyond direct energy savings – such as price suppression and avoided infrastructure investments – are also included. In the gas bill impact analysis, rate impacts for different sectors account for the EE charge, while consumption impacts are modeled based on predicted participation and energy savings in the 2018 plan.

Changes from Last Year

National Grid made an important update to the methodology used in the Bill Impacts Analysis from last year. On the residential side there has been no change compared to previous years as there is only one rate for Non-Income Eligible Residential Customers (A-16) and Income Eligible Residential customers (A-60). For 2018, the Bill Impact Analysis has been updated to provide a clearer picture of bill impacts for commercial customers. The Company has differentiated different types of commercial customers by adding a Medium Commercial bill impact analysis. Additionally, the Company has modeled by rate code the energy savings that come from participation in various programs and channels because it is more illustrative of the many different ways that Commercial customers access energy savings. For example, in the past, a franchise of restaurants was likely served through the Company's Small Business Direct Install Program. Today, in contrast, National Grid works with franchises through the food service initiative which is part of the Large Commercial Retrofit Program, even though each franchise is a small business and most use the small C&I (C-06) rate.

Key Findings

Despite changes to the methodology, the key findings did not change dramatically from last year to this year. The key findings of the bill impact analyses are:

- Most customers are participating in EE programs.
- High participation means that, over the lifetimes of the programs proposed for 2018, the average Rhode Island customer's (participants and non-participants combined) bill will be less than if there were no programs. Overall, rates may increase, but energy savings from participation in EE programs results in bill savings that offset the costs of the EE program charge and revenue recovery.

Electric Bill Impact Methodology

The electric bill impact models used to generate the electric results were adapted from models originally built by Synapse Energy Economics on behalf of the Division of Public Utilities and Carriers in 2013. These models are distinct from the traditional electric bill impacts models the Company presents in Rates proceedings before the PUC. The new models analyze two cases: the fulfillment of the 2018 Plan and the absence of an efficiency plan in 2018. This comparison isolates the effects of the proposed 2018 EE program charge and Fully Reconciling Funding Mechanism. It assumes energy efficiency plans have been implemented before 2018 but will not be offered starting in 2018. The analysis also incorporates how system-wide reduction in energy consumption affects the different elements of rates such as transmission, distribution, and commodity charges.

Five separate electric models were developed, one for each of the main customer segments: Residential, Income Eligible, Small Commercial, Medium Commercial, and Large Commercial and Industrial. For all of the electric models, the key inputs are the net planned participation and savings numbers from Table E-7 in Attachment 5.¹ The models combine these data with rate class information to determine the benefits to customer bills from program participation. Table 1 below shows the mapping of efficiency programs to rate classes for the five models.²

¹In 2017, there were four Bill Impact models in total. In 2018, there are five models – the addition is the C&I Medium Commercial (G02) model. In 2017, medium commercial customers were split between the small and large commercial models, now they are differentiated. This change allows for a more realistic depiction of bill impacts because there is a wide array of usage among commercial customers and having more groupings helps illustrate typical impacts.

²Delivery service rate docket used in the analysis are R.I.P.U.C No. 2100 for basic residential rate, R.I.P.U.C No. 2101 for low-income residential rate, R.I.P.U.C No. 2104 for small C&I rate, R.I.P.U.C No. 2139 for medium C&I rate, R.I.P.U.C No. 2147 & 2141 for large C&I rate. Standard Offer Service rates used in the analysis are R.I.P.U.C. No. 2096 A-06 & A-16 total commodity charge for standard and low income residential rate group, C-06 total commodity charge for small C&I rate group, C-06 total commodity charge for small C&I rate group and G-32 total commodity charge for large C&I rate group.

The diversity of the commercial customer profile means that customers from multiple rate classes can participate in any commercial program. Assumptions for these rate classes were made based on historical program participation data³.

Table 1: Electric Rate and Program Mapping

Bill Impact Model	Rate Class(es)	Efficiency Programs
Residential Electric	A-16	Home Energy Reports
		EnergyStar HVAC
		EnergyWise Multifamily
		EnergyStar Lighting
		Residential Consumer Products
Income Eligible Electric	A-60	Income Eligible Single Family
		Income Eligible Multifamily
		Home Energy Reports
		EnergyStar Lighting
Small Commercial	C-06	Small Business Direct Install
		Large Commercial New Construction
		Large Commercial Retrofit
Medium Commercial	G-02	Small Business Direct Install
		Large Commercial New Construction
		Large Commercial Retrofit
Large Commercial	G-32, G-62	Small Business Direct Install
		Large Commercial New Construction
		Large Commercial Retrofit

Explanation of Electric Bill Impact Results

The results of the models are shown in Tables 2 through 6, and some highlights of the results are presented after the Tables. The columns in the Tables are as follows:

- Long-term rate impacts are defined as the average rate increase percentage from 2018 to 2038 (positive numbers indicate rate increase).
- Typical energy savings refer to the average percentage of energy savings to total annual consumption from 2018 to 2038 (positive numbers indicate electricity consumption reduction).
- Typical bill savings are defined as average percentage of bill decrease to total customer bill from 2018 to 2038 (positive numbers indicate electricity bill reduction).

³ Savings and participation modeled by C&I rate classes is partitioned and estimated based on historical data.

The long-term rate impacts, typical energy savings, and typical bill savings are shown for average participants in energy efficiency programs, non-participants, and average customers within each of the five main customer segments. Average customers combine the bill impacts of EE participants and non EE participants to show the impacts of all customers combined. For the 2018 Bill Impact analysis the key finding is that, over the lifetimes of the programs proposed for 2018, the average Rhode Island customer's (participants and non-participants combined) bill will be less than if there were no programs.

Table 2: Residential Bill Impact Analysis – A16 (2018 EE Plan vs. No EE)

Residential	Long-Term Rate Impacts	Typical Energy Savings	Typical Bill Savings
	(% of Total Rate)	(% per Participant)	(% of Total Bill)
Average Participant	1.31%	2.02%	1.56%
Non-Participant	1.31%	0.00%	-1.31%
Average Customer	1.31%	1.87%	1.35%

Table 3: Income-eligible Bill Impact Analysis – A60 (2018 EE Plan vs. No EE)⁴

Income-Eligible	Long-Term Rate Impacts	Typical Energy Savings	Typical Bill Savings
	(% of Total Rate)	(% per Participant)	(% of Total Bill)
Average Participant	1.82%	4.06%	3.69%
Non-Participant	1.82%	0.00%	-1.82%
Average Customer	1.82%	3.90%	3.47%

Table 4: Small Commercial Bill Impact Analysis – C06 (2018 EE Plan vs. No EE)⁵

	Long-Term Rate Impacts	Typical Energy Savings	Typical Bill Savings
	(% of Total Rate)	(% per Participant)	(% of Total Bill)
Small C&I Participant	0.54%	17.60%	15.80%
Non-Participant	0.54%	0.00%	-0.54%
Average Customer	0.54%	1.45%	0.81%

⁴ Home Energy Reports and Energy Star Lighting participation and savings are split between standard residential and income-eligible customers, since these measures reach all residential customers. For analysis purposes, it is assumed that income-eligible customers account for 10% of participation and 10% of savings in the two programs.

⁵ For 2018, the small business (C-06 rate) customer count has been refined to better estimate customers. The number of accounts on the C06 rate is greater than the number of customers, for example there are many accounts for cell towers, pumps, etc. that belong to one customer. This is an estimate based on the best data currently available to the Company.

Table 5: Medium Commercial Bill Impact Analysis – G02 (2018 EE Plan vs. No EE)

	Long-Term Rate Impacts	Typical Energy Savings	Typical Bill Savings
	(% of Total Rate)	(% per Participant)	(% of Total Bill)
Medium C&I Participant	0.30%	12.82%	11.58%
Non-Participant	0.30%	0.00%	-0.30%
Average Customer	0.30%	1.88%	1.42%

Table 6: Large Commercial & Industrial Bill Impact Analysis – G32, G62 (2018 EE Plan vs. No EE)

	Long-Term Rate Impacts	Typical Energy Savings	Typical Bill Savings
	(% of Total Rate)	(% per Participant)	(% of Total Bill)
Large C&I Participant	0.25%	5.59%	5.35%
Non-Participant	0.25%	0.00%	-0.25%
Average Customer	0.25%	2.67%	2.42%

On the residential side, rates increase for all rate classes. For all rate classes non-participant bills increase slightly, while participant and average customer bills go down. The decreased average customer bills demonstrate that the scale of the energy savings due to program participation outweighs the incremental costs to implement the program. On the commercial side, long-term rates increase slightly for small, medium, and large C&I customers. This is primarily due to a decrease in annual kW savings from 2017 to 2018. For Small, Medium, and Large Commercial customers, non-participant bills increase slightly, while bills decrease for participants and average customers.

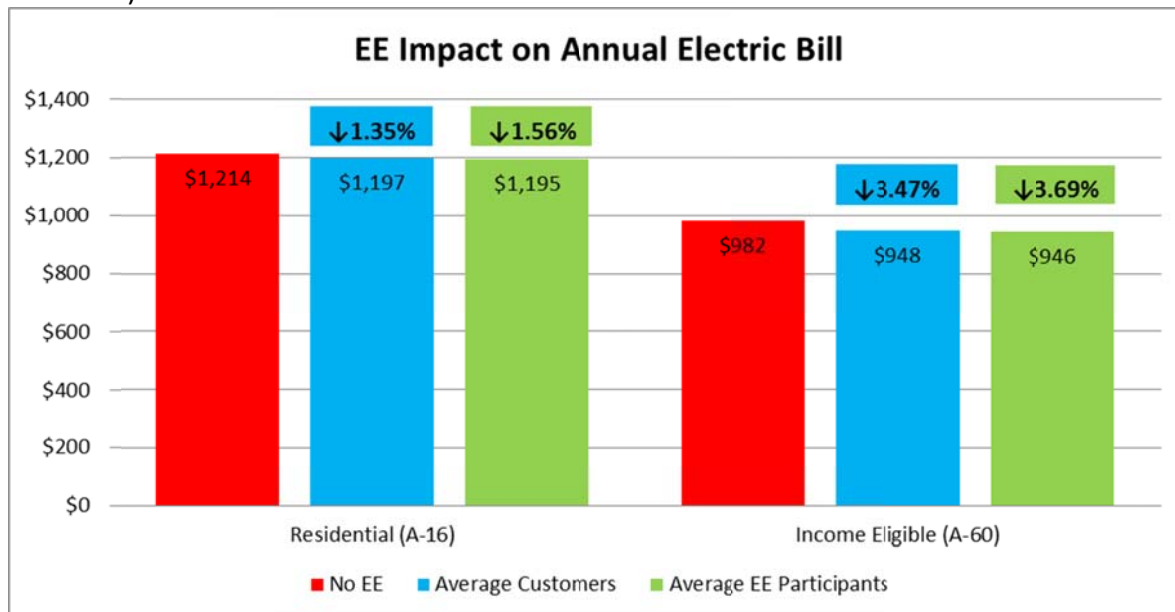
- *Residential long-term rate impacts:* EE programs bring system benefits in terms of avoided infrastructure investment in generation, transmission, and distribution in the long-run. These avoided investments will ultimately flow through rates and offset the short-term contribution of the EE program charge to 2018 rates (about 5%) and bring the long-term rate increase down to 1.31% for standard residential customers and 1.82% for income-eligible residential customers.
- *Small, Medium, and Large C&I long-term rate impact:* avoided infrastructure costs flow through rates and partially offset the EE program charge for 2018 and beyond, leading to only a 0.54% increase in rates for small C&I customers, 0.30% for medium C&I customers, and 0.25% for large C&I customers in the long run.
- *Average participant bill savings:* the proposed EE programs will bring bill savings to participants in all rate groups. Specifically, typical bill savings are 1.56% for standard residential participants, 3.69% for income-eligible residential participants, 15.80% for

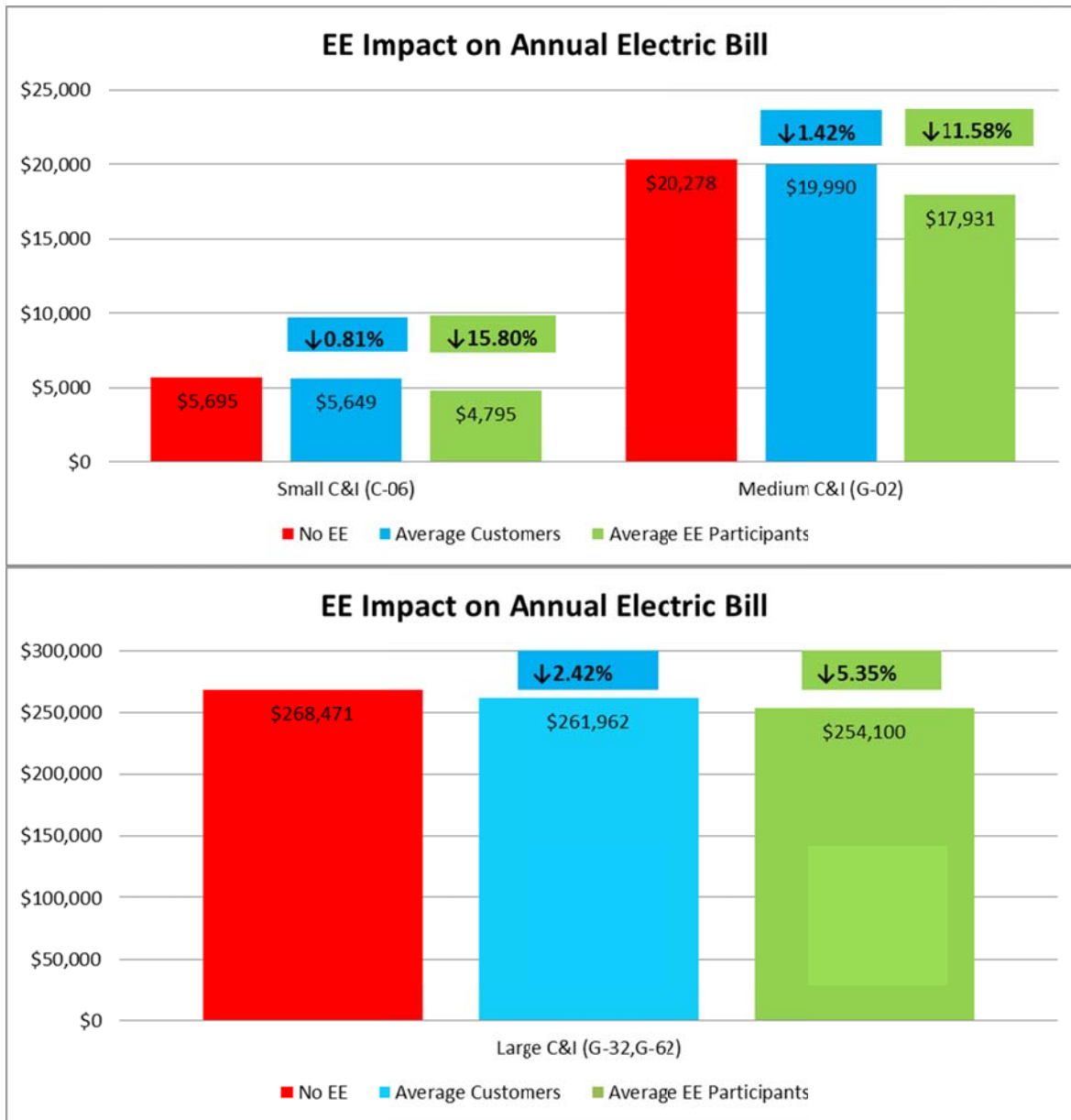
small C&I participants, 11.58% for medium C&I participants, and 5.35% for large C&I participants (Tables 2-6).

- For the 2018 Bill Impact Analysis, Commercial participation by rate class is assumed to be similar to 2016 data.
- *Average customer typical bill savings:* among all participants and non-participants, typical bill savings is 1.35% for standard residential customers, 3.47% for income-eligible residential customers, 0.81% for small C&I customers, 1.42% for medium C&I customers, and 2.42% for large C&I customers, indicating that the proposed EE programs will bring net benefits to all types of electric customers in Rhode Island (Tables 2-6).

Figure 1 shows an example of electric bill reduction for average residential, income-eligible, small C&I, medium C&I and large C&I customers and participants. Bills are calculated based on average annual consumption of a typical customer in Rhode Island (residential and low-income: 6000 kWh; small C&I in C-06 rate group: 33,000 kWh, medium C&I in G-02 rate group: 158,400 kWh, large C&I in G32 and G62 rate groups: 2.34 million kWh). In the figures below, the rates are the same as rates used in the bill impact analysis above. This illustration is different from traditional incremental bill impacts because it shows the long-term bill impact of the proposed EE programs and accounts for the measure life of the energy efficiency measures.

Figure 1: Example of Typical Participant and Customer Annual Electric Bill Impact (2018 EE Plan vs. No EE)





Gas Bill Impact Methodology

The natural gas bill impacts were analyzed by adapting an existing gas bill impact model used by the Company in dockets 4708 and 4719.⁶ The updated model analyzes the effects of the 2018 Plan by looking at a change in average consumption due to energy efficiency. The adapted gas models do not account for efficiency's effects on future gas rates. They only look at direct energy savings for the rate classes that best map to the four efficiency customer segments: Residential, Income Eligible, Small Business, and Large Commercial and Industrial. The table below shows the mapping of rates to customer segments.⁷

Table 6: Gas Rate Mapping

Bill Impact Model	Rate Class(es)
Residential Gas	Residential Heating
Income Eligible Gas	Residential Heating – Low Income
Small Commercial Gas	C&I Small
Large Commercial Gas	C&I Medium, Large Low Load, Large High Load, Extra Large Low Load, Extra Large High Load

Explanation of Gas Bill Impact Results

The proposed EE programs lead to reduction in participant bills. Moreover, the annual bills for average customers (participants and non-participants combined) are also projected to decrease for all four rate groups (residential heating, low-income heating, small commercial and large commercial). The detailed bill reduction percentages are shown in Table 7. The columns in the Tables are as follows:

- The rate impact is calculated as percent increase in rates due to EE (positive numbers indicate rate increase).
- The participant bill savings is defined as percent change in participant bill over the lifetime of the EE programs (positive numbers indicate participant bill decrease).
- The average customer bill savings is expressed as the percent change in total bill for average customers (participants and non-participants combined and positive numbers indicate average customer bill decrease).

⁶ Proposed DAC rates are in Docket 4708 and proposed GCR rate are in Docket 4719.

⁷ The analysis uses residential and income eligible heating to represent the two groups. As of August 2016, residential heating represents 91% of standard residential customers and income eligible heating represents 98% of income eligible customers.

Table 7: RI Gas Bill Impact Analysis

Rate Group	Rate Impact (% of 2018 Total Rate)	Average Participant Bill Savings (% Change in 2018 Bill)	Average Customer Bill Savings (% Change in 2018 Bill)
Residential Heating	5.65%	0.93%	0.51%
Low Income Heating	5.65%	8.28%	1.75%
Small Commercial	4.60%	3.22%	0.01%
Large Commercial	4.96%	2.23%	0.75%

- The total EE contribution to the 2018 gas rate is 5.65% for residential rates and, 4.60% for small C&I rates, and 4.96% for large C&I rates.
- Typical bill savings is 0.93% for standard residential participants, 8.28% for income-eligible residential participants, 3.22% for small C&I participants, and 2.23% for large C&I participants (Table 7).⁸
- The average customers in all rate groups will experience bill decrease (0.51% for standard residential customers, 1.75% for income-eligible residential customers, 0.01% for small C&I customers, and 0.75% for large C&I customers), indicating that the proposed EE programs will bring net benefits to all types of gas customers in Rhode Island (Table 7).

Figure 2 shows an example of gas bill reduction for average residential heating, income-eligible heating, small C&I, and large C&I customers and participants. Bills are calculated based on average annual consumption of a typical customer in Rhode Island (standard residential: 846 therms, low-income residential: 846 therms, small C&I: 1,352 therms, large C&I: 269,689 therms).

Figure 2. Example of Annual Gas Bill Impact on Typical Participant and Customer (2018 EE Plan vs. No EE)

⁸ The difference in bill reduction percentage between standard residential and income-eligible participants is mainly driven by Home Energy Reports for standard residential customers. Home Energy Report brings less direct energy savings to participants. This analysis assumes Home Energy Reports are offered to standard residential customers.

